BREAK-IN

May/June 2012

The Official Journal of the
New Zealand Association of Radio Transmitters (Inc.)

Dedicated to

Amateur Radio and Electronics

in New Zealand since 1928

WARO 50th ANNIVERSARY

Celia ZL1ALK and Norma ZL1ANP cutting the Anniversary cake.

WARO Past Presidents

In this issue:

- Down to basics with antennas; Part 2
- Working with coaxial transmission lines and connectors; Part 2
- QRP Communications
- An electret microphone for a ZC1
- How to buy a paddle key
- Musick Memorial Station; Branch 86's clubrooms
- World Radio Conference 2012
- ZL Crossword No.16

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BREAK-IN

Volume **85**
Number **3**
MAY/JUNE 2012

*The term **break-in** refers to a system in CW whereby the transmitting station can hear the other station's signal during "key up" periods.*

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From The Editor

John Walker ZL3IB
<editor@nzart.org.nz>

Not a lot to report from the Editorial desk for this issue but that is not to say that the *Break-In* team hasn't been hard at work preparing this issue. It still takes quite a lot of time and effort to turn submitted copy into a printed version of *Break-In*.

Briefly the process goes something like this;–

- Pre-deadline reminder emailed out around first of the month.
- Received copy acknowledged. Then edited and processed into standard Bi format suitable for the typesetter. Figures and graphs redrawn if necessary.
- Edited copy sent to typesetter.
- Galley proofs received for checking by proof readers (Bi team).
- Proofed copy "pasted-up" into final page layout ready to be reset into final format.
- Corrected proofs and "pasted-up" lay-out rechecked.
- Proofed copy processed into final format suitable for printing; this uses a very specialised computer program.
- Printed copies sent to Datamail for distribution.

Hopefully our members then receive an interesting magazine.

Finally of all I am sure that we all will want to offer our congratulations to WARO on the occasion of their 50th anniversary. Well done ladies!

73 *John Walker ZL3IB, Editor*
<john.zl3ib@ihug.co.nz>

Next deadline for copy is
10 July 2012

Contributions to Break-In

Break-In is a forum for NZART member's amateur radio projects, experiences, opinions and news. Your contributions and feedback is welcomed. Contact the Editor John Walker ZL3IB at <john.zl3ib@ihug.co.nz>

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From The President

Vaughan Henderson ZL1TGC
<vaughan@bidecphone.co.nz>

This issue of *Break-In* will be in your hands in early June, just after our annual general meeting and Conference. As I write this in early May, with a little over three weeks to go to Conference, it is very pleasing to report a good level of interest from members with registrations for the Queen's Birthday weekend event at over 120 and more expected before the cut-off date.

I've also had feedback from some members who tell me that, as much as they would like to attend, the combined cost of transport, accommodation and conference registration is beyond their resources in these tight economic times. This is a very real consideration for many of you and I'd appreciate your input on how we can try to reduce the cost of the overall conference experience. Your Association is very dependent on Branches around the country being willing to host the annual conference and finding the usually small band of volunteers who give up their spare time form a committee to run the conference. As I write this, we don't have a Branch who has offered to host our conference for 2013. I am hopeful that this will change when the call goes out at this year's AGM for an offer to host next year's AGM and Conference. If we don't get anyone willing to do this, then we may have to revert to a one day event held at some central location, probably Wellington, in order to hold an annual general meeting. Please let me, or your local Councillor, or Debby at Headquarters know if your club is willing to host the 2013 AGM.

As advised in the last issue of *Break-In*, Council wants to encourage branches that have licences for repeaters, beacons and fixed links currently held in the name of NZART to take back ownership of these. The current system of invoicing and renewals means a heavy administrative workload for Headquarters and FMTAG at a time when subscription renewals are also being processed. HQ Infoline #250 lists all the Branches and affiliated organisations and has more detail on the costs and the advantage of a small saving to Branches for each licence if they pay the licence directly to the MED. If your Branch does not want to make payment direct to the MED, then the licence can stay in the name of NZART, however, the prompt payment discount offered by the MED will be retained by headquarters to offset the administrative overhead. Can I encourage your Branch to look at taking ownership of the licence(s). To start the licence transfer process, please send an email to FMTAG <fmtag@nzart.org.nz> to receive a helpful information pack.

Attracting more advertising to help offset the cost of *Break-In* is something we can all try and help with. Do you work for a company that may be interested in reaching amateur radio operators through this magazine? Perhaps you could approach the appropriate person in your company and mention that *Break-In* would be a good publication to place an advertisement. If you are interested in pursuing this suggestion, please get in touch with Lorne Douglas ZL2AHB who would be pleased to advise the advertising rates.

Perhaps you work for or have retired from the advertising industry? Your Association would be interested in having a member willing to volunteer some time to find new advertisers for *Break-In*. The advertisements do not have to be directly related to amateur radio, but might be products that would be of interest to our members. If you think you can assist, please get in touch with Lorne ZL2AHB at <advertmanager@nzart.org.nz>

It's always a sad occasion when Council receives a request to place a Branch in recess. This issue of *Break-In* contains the formal notice of intention to place Southern Wairarapa Branch 82 into recess. This process has been initiated by a request from the last remaining member of that Branch who has tried over the past several years to interest amateurs living in the area in revitalising the Branch. If you are reading this and are living in the area, please give some thought to contacting your fellow amateurs and let's try and get the Branch up and going again.

The successful negotiation of an increase in the amateur power limit from 500 to 1000 watts peak envelope power last November has raised the question of compliance with the New Zealand Standard NZS 2772: Part 1:1999 "Radiofrequency Fields Maximum Exposure Levels; 3 kHz to 300 GHz". Our adviser on these matters is Dr. David Black, ZL1MZ who is also our representative on the Non-Ionising Radiation Standards Committee. David advises as follows: For amateurs operating on frequencies below 50 MHz, there is no cause for concern over the increase in ERP as the absorption of RF energy by the human body at HF is quite low. At frequencies above 100 MHz the increase in ERP will have an effect on the body, mainly in the form of heating. He advises amateurs who are planning on operating at the new higher power level to re-calculate the power density at the boundary of their property to ensure that the limits set out in the NZ Standard are not exceeded. If your amateur station includes one or more high gain directional antennas you should definitely "do the sums". We have a responsibility to ensure that passing members of the public are not exposed to levels of radio frequency energy in excess of those set out in the standard.

Vaughan Henderson ZL1TGC
President, NZART (Inc)

Notice of Intention to place the Southern Wairarapa Branch 82 into Recess

Council has received a request from the one remaining member of the Southern Wairarapa Branch 82, to place the Branch into recess. Repeated attempts by that member over the last 10 years to interest amateurs living in the Southern Wairarapa area to join the Branch have not met with any success. This notice was published in HQ InfoLine #250 and in May/June *Break-In* to advise members of the intention to place Branch 82 into recess. If any amateurs in the Southern Wairarapa area are interested in re-forming the Branch, please advise Debby ZL2DL at NZART Headquarters either by email or in writing. Closing date for expressions of interest is Friday 22 June 2012.

Vaughan Henderson ZL1TGC NZART President

NZART Radio Science Education Trust

Application for Grant-in-Aid

Applications are invited from secondary school science teachers and other training providers for Grants-in-Aid from the NZART Radioscience Education Trust to promote the development of projects in the general areas of radio and/or electronics. It is anticipated that these projects will lead to entries in the local area Science & Technology Fair. Grants will not normally exceed $250.00

Applications should normally be received no later than 30 May of the year of application. Application forms maybe obtained from; The Trustees, NZART Radioscience Education Trust, PO Box 1733, Christchurch 8140, or from <trustee@nzart.org.nz>. Applications should be endorsed by the Head of Science or, for other organisations, the President/Chairpserson.

Down to basics with antennas Part 1

Reprinted from Radiocomms 2011 with kind permission of Westwick-Farrow Media and Clarke & Severn Electronics. Hornsby NSW.

Antennas are the heart of every radio transmitter and receiver. So vital are they that it seems appropriate to look more closely at them. And whether you are experienced in their use or are coming to them for the first time, there is bound to be information here that could be useful.

An RF antenna is defined as a component that facilitates the transfer of a guided wave into, and the reception from, free space.

In function, the antenna is essentially a transducer that converts alternating currents into electromagnetic fields or vice versa.

The physical components that make up an antenna's structure are called elements. From a coathanger to a tuned Yagi, there are literally hundreds of antenna styles and variations that may be employed.

Receive and transmit antennas are very alike in characteristics and in many cases are virtual mirror images of each other.

However, in some cases, it is often advantageous to select different characteristics for the transmitter and receiver antennas. For this reason, each will be looked at separately.

The transmitter antenna allows RF energy to be efficiently radiated from the output stage into free space.

In many modular and discrete transmitter designs the transmitter's output power is purposefully set higher than the legal limit. This allows a designer to use an inefficient antenna to achieve size, cost or cosmetic objectives and still radiate the maximum allowed output power.

Since gain is easily realised at the transmitter, its antenna can generally be less efficient than the antenna used on the receiver.

The receiving antenna intercepts the electromagnetic waves radiated from the transmitting antenna.

When these waves impinge on the receiving antenna, they induce a small voltage in it. This voltage causes a weak current to flow, which contains the same frequency as the original current in the transmitting antenna.

A receiving antenna should capture as much of the intended signal as possible and as little as possible of other off-frequency signals. Its maximum performance should be at the frequency or in the band for which the receiver was designed. The efficiency of the receiver's antenna is critical to maximising range performance.

Unlike the transmitter antenna, where legal operation may mandate a reduction in efficiency, the receiver's antenna should be optimised as much as is practical.

A transmission line is any medium whereby contained RF energy is transferred from one place to another.

Many times a transmission line is referred to as "a length of shielded wire" or "a piece of coax". While technically correct, such casual references often indicate a lack of understanding and respect for the complex interaction of resistance, capacitance and inductance that is present in a transmission line.

The diameter and spacing of the conductors as well as the dielectric constant of the materials surrounding and separating the conductors plays a critical role in determining the transmission line's properties.

One of the most important of these properties is called characteristic impedance. This is the value in ohms at which the voltage-to-current ratio is constant along the transmission line.

All modules made by Linx™ are intended to be used with transmission lines having a characteristic impedance of 50 Ω.

To achieve the maximum transfer of RF energy from the transmission line into the antenna, the characteristic impedance of the line and the antenna at frequency should be as close as possible. When this is the case, the transmission line and antenna are said to be matched.

When a transmission line is terminated into an antenna that differs from its characteristic impedance, a mismatch will exist. This means that all the RF energy is not transferred from the transmission line into the antenna.

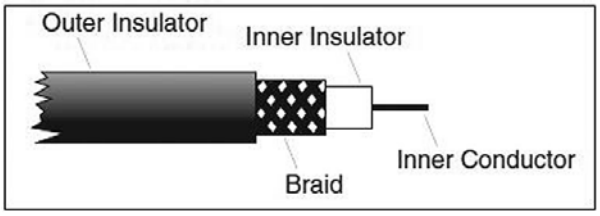


Figure 1. Typical tranmission line.

The energy that cannot be transferred into the antenna is reflected back on the transmission line. Since this energy is not reflected into space, it represents a loss. The ratio between the forward wave and the reflected wave is known as the standing wave ratio (SWR).

The ratio between the sum of the forward voltage and the reflected voltage is commonly called the voltage standing wave ratio (VSWR).

The electric and magnetic fields radiated from an antenna form an electromagnetic field. This field is responsible for the propagation and reception of RF energy.

To understand an antenna's function properly, an in-depth review of voltage, current and magnetic theory would be required. Since this is not in keeping with the basic nature of this article, a simple overview will have to suffice.

Assume for a moment that a coaxial transmission line was stripped and the shield and centre conductor were bent at right angles to the line as illustrated. Presto, a basic antenna called a half-wave dipole has just been formed.

You may wonder how two pieces of wire originally intended to contain RF energy are now able to radiate it efficiently into free space. Since the lines are now separated with the ends open, a difference in voltage between the two points now exists.

This allows formation of an electric field called the (E) field. A magnetic field, called the (H) field, is also generated by current. When RF energy is introduced onto the antenna element, these fields alternately build up, reach a peak and collapse.

Together these fields make up electromagnetic waves that are able to radiate into and be received from free space.

An antenna can be considered a complex RLC network. At some frequencies it will appear like an inductive reactance, at others like a capacitive reactance.

At a specific frequency both the reactances will be equal in magnitude, but opposite in influence and thus cancel each other. At this specific frequency the impedance is purely resistive and the antenna is said to be resonant.

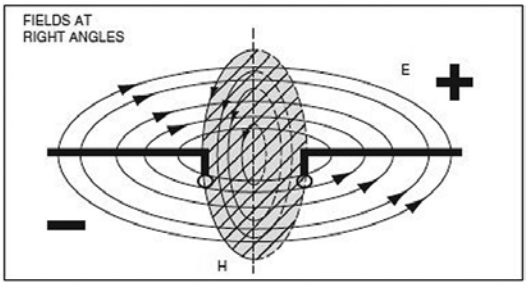


Figure 2. E and H fields surrounding an antenna.

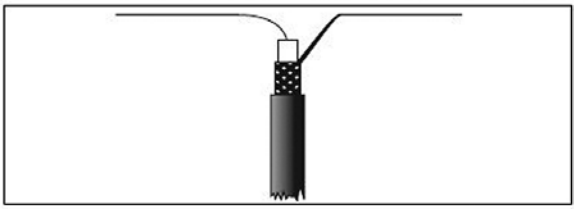


Figure 1. Basic antenna.

Maximum antenna efficiency is always obtained when the antenna is at resonance. When an antenna's length is incorrect, the source will see something other than the pure resistance that is present at the resonant point.

If the antenna is too short, capacitive reactance is present; if it is too long, inductive reactance will be present. The indicator of resonance is the minimum point in the VSWR curve.

In the following example, antenna (A) is resonant too low, indicating the antenna is excessively long, while antenna (C) is resonant at too high a frequency, indicating the antenna is too short.

Antenna (B), however, is ideal. Clearly, it is critical that an antenna is the correct length, but how is that length determined?

The true issue is antenna resonance.

Depending on physical factors, such as the size and orientation of the ground plane, nearby conductors, etc, it may be necessary to adjust the antenna's length to reach resonance.

An antenna does not have to be the physical length of a full wave to operate. Often, for size and impedance considerations, the antenna will be some fraction of a full wavelength.

A half-wave antenna is the shortest resonant length of an antenna. However, shorter wavelengths can be resonant on harmonics. Because of its compact length, one of the most popular antennas is the ¼-wave whip.

In this configuration, the antenna element is ¼ of a full wavelength. To operate effectively the ¼ wave must radiate against a ground plane.

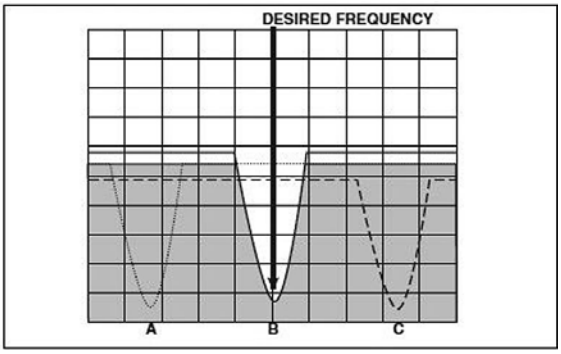


Figure 4. Resonance curves.

Every frequency has a certain physical length that it occupies in space. That length is referred to as the wavelength and is determined by two factors: 1) the frequency itself and 2) the speed of propagation.

The wavelength of the operational frequency determines antenna length. Since an antenna has a dielectric constant greater than that of free space, the velocity of a wave on the antenna is slower.

This plane is commonly formed by a metal case or ground area on a PCB.

The ground plane acts as a counterpoise that forms the other ¼-wave element, creating in essence a half-wave dipole.

Antenna resonance should not be confused with antenna impedance.

The difference between resonance and impedance is most easily understood by considering the value of VSWR at its lowest point. The lowest point of VSWR indicates the antenna is resonant, but the value of that low point is determined by the quality of the match between the antenna and the transmission line it is attached to.

This point of attachment is called the feedpoint. In the diagram below you will notice both antenna (A) and antenna (B) are resonant; however, antenna (B) exhibits a much lower VSWR.

This is because the feedpoint impedance of (B) is more closely matched to the impedance of the transmission line.

Clearly an antenna must be both resonant and matched for maximum RF energy to be propagated into free space.

The point of resonance is largely determined by antenna length, but how is antenna impedance determined? When an antenna is at resonance it presents a purely resistive load.

This resistance is made up of three factors. First, when considered only as a conductor, there is loss through the real physical resistance of the antenna element. This is called ohmic resistance loss.

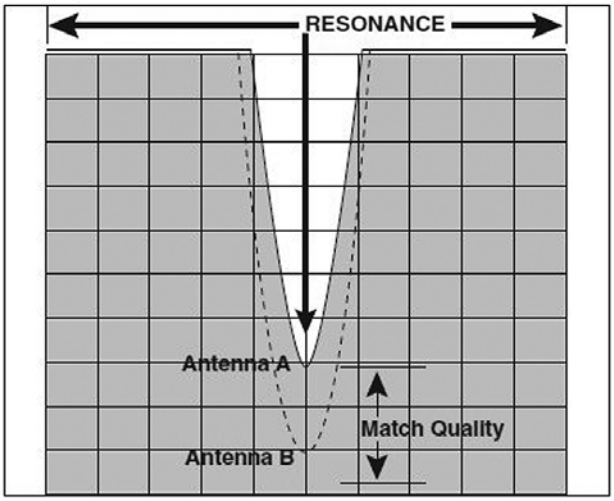


Figure 6. Antenna match quality.

The second and most important area of loss is through radiation resistance (Rr). Radiation resistance is the ohmic value of a theoretical resistor that, if substituted for the antenna, would dissipate the same amount of RF energy as the antenna radiates into space.

The last source of resistive loss is through the leakage resistance of dielectric elements.

Since the real and leakage resistances are usually negligible, we will focus on radiation resistance.

As mentioned previously, radiation resistance is a hypothetical concept that describes a fictional resistance that, if substituted in place of the antenna, would dissipate the same power that the antenna radiates into free space.

The radiation resistance of an antenna varies along the length of the antenna element but our concern is with the resistance at the feedpoint. The radiation resistance increases as a conductor lengthens.

In general, the radiation resistance for a ¼ wave vertical is about 37 Ω, for a half-wave about 73 Ω. βi

To be continued…

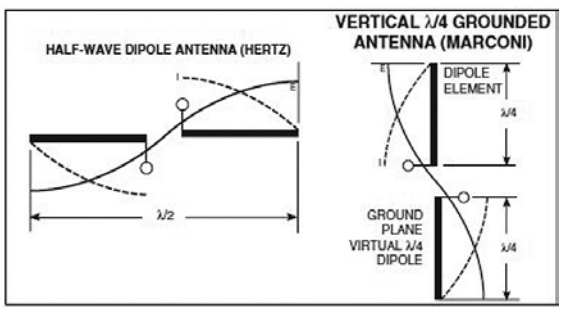


Figure 5. Dipole antenna operation.

Coming up

It is hoped to print the following articles in future issues of *Break-In.*

- Down to basics with antennas; Pt 2.
- What do they do with those big dishes ? What is radio astronomy ?
- The LogiTALKER voice keyer.
- A 6 metre Moxon portable antenna.
- 30m QRSS beacon transmitter.
- JBOT; SSB linear amplifier.

Review and constructional articles are most welcome.

Working with Coaxial Transmission Lines and Connectors; Part 2 of 2

by David Conn VE3KL

(Reprinted from The Canadian Amateur, March/April 2011)

Introduction

Transmission lines and connectors are used by all of us in our radio/antenna systems. They are many problems associated with them such as corrosion, broad manufacturing tolerances and unknown characteristics. Many of us have purchased a roll of coaxial cable at a flea market that is quite old and probably does not have a brand name label marked on it. So, how can we determine if the cable is worth using with our expensive radios? Even new cables are suspect if we cannot find the manufacturers specifications and tolerances.

(Note: This article uses TCA HotLinks to provide access to enriched media from the RAC website. For more information, please go to <www.rac.ca/tca. Mar/Apr>)

These articles address the above problem and show methods for selecting, testing and maintaining cables and connectors. Simple tests include the use of a DC multi-meter to measure the resistance of a shorted cable or the use of low frequency L-C meters to check out the cable impedance, length and velocity factor. These tests do not tell you much about the cable performance at high frequencies so we can use a simple low cost RF SWR meter to gain more information. However, the best way to collect the data is with a vector impedance meter (one port) or to use a very expensive vector network analyzer (two port). These two port vector network analyzers are used by a few amateurs but very complex calibration methods are needed to make full use of them. However, high quality multi-port vector network analyzers are being developed for amateurs at a reasonable price.

Outline

Part I of this series presented the basic ideas used in the articles and showed how to make simple measurements of impedance (*Zo*), Velocity Factor (*VF*) and cable diagnostics with the aid of a digital multimeter and low frequency L-C meter.

Part II of the series discusses more advanced methods of cable characterization using SWR and vector impedance meters. Typical measurement instruments used for the characterization are shown in Figure 1 which shows a simple L-C meter, an SWR/Z meter and a full vector impedance meter.

This part of the series presents the details of measuring the characteristic impedance, velocity factor and loss of coaxial or other cables. There are many ways and meters that can be used to measure these items including the use of expensive two port network analyzers.

The methods presented here use the AIM 4170 vector impedance meter to find the characteristic impedance and velocity factor and the MFJ259B meter to find the cable insertion loss. Both of these meters are commonly used by amateurs.

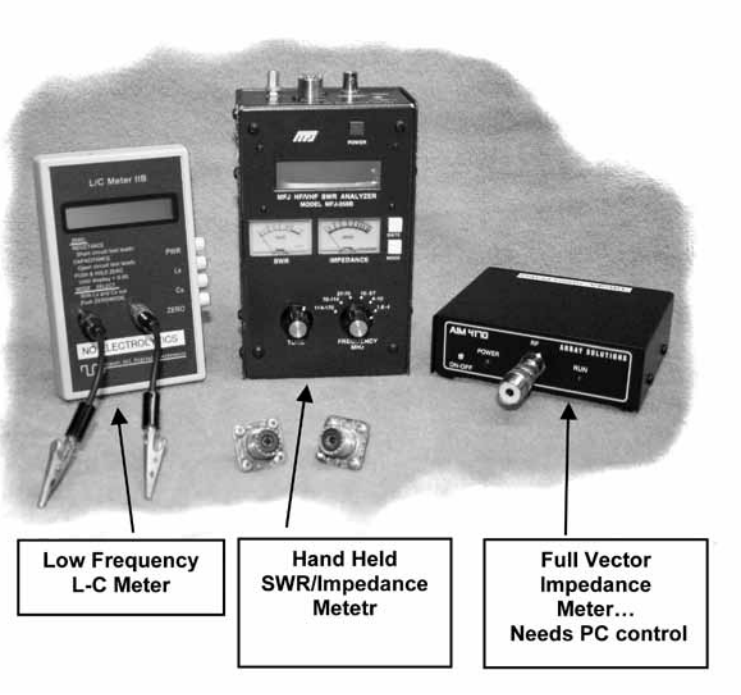
Measuring the Characteristic Impedance using Vector Impedance meters

This section presents a straight forward method of measuring the characteristic impedance of a cable.

The frequency can be set to any needed value such as 28 MHz. The line length should be approximately ⅛ wavelengths long at your frequency of interest for best accuracy. However, the length is not critical as long as it is not ¼ of a wavelength. The reason for not using cable lengths close to ¼ wavelength is that the measured values get very large/small reducing the accuracy of the calculation. The method is very simple. Follow the following method:

Connect the cable to your impedance meter. I use the AIM 4170 vector impedance meter. In this step, leave the far end of the cable open circuited. Measure the input impedance, *Zoc*.

Figure 1. Test Equipment; L-C Meter, Hand-held SWR/Impedance Meter, Computer-controlled Vector Impedance Meter



Repeat the above measurement with the cable short circuited. The measured impedance is this case is *Zsc*. To short circuit the cable, do not use a connector. Simply solder the inner conductor directly to the outer conductor keeping the leads as short as possible.

The impedance in this case is given as:

$$Zo = \sqrt{Zoc * Zsc} \quad [Ohms]$$

Here, *Zoc* is the measured impedance, (R, X), for the open circuit case and *Zsc* is the measured impedance, (R, X), for the short circuit case. Since *Zoc* and *Zsc* are complex numbers, it is best to enter the measured data into a calculator to make the process easy. A calculator is available for this purpose on my web site, <http://ve3kl.com/>, under the heading of Calculators (see TCA Hotlink,1). The calculator also has the added feature that it logs all of your measurements into an Excel spreadsheet for future reference.

An example of typical measurements is given in Figures 2 and

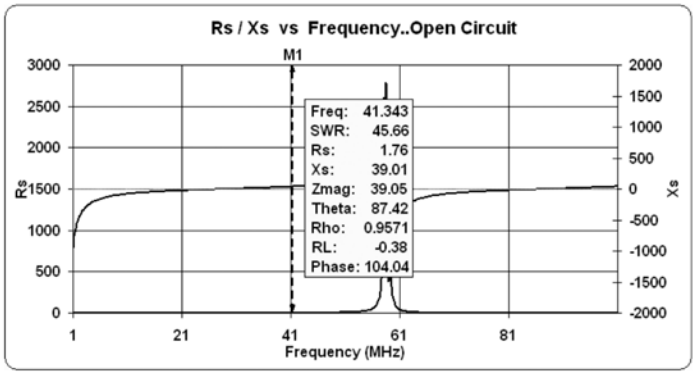


Figure 2. Open Circuit Impedance Measurements. Tramflex 50 Ohm RG8-X Cable, Length = 2 metres. Zoc = 1.76 + j39.01 @41.343 MHz

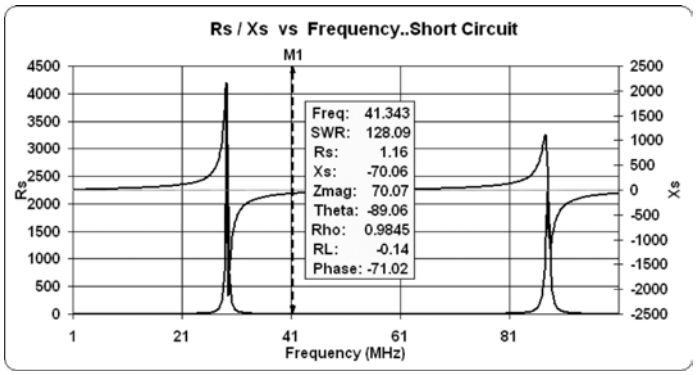


Figure 3 Short Circuit Impedance Measurements. Tramflex 50 Ohm RG8-X Cable; Length = 2 metres. Zsc = 1.16 – j70.06 Ohms @41.343 MHz

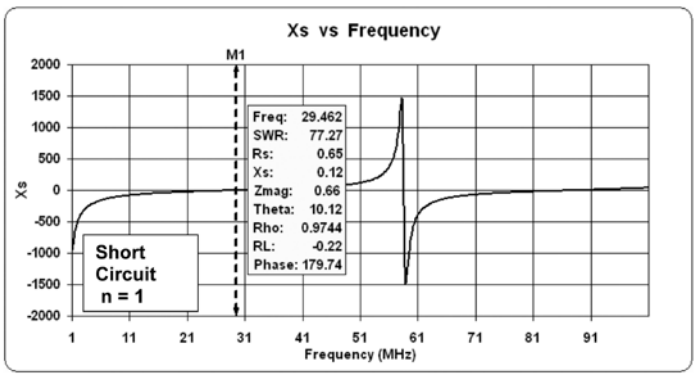


Figure 4. Open Circuit VF Measurements. Tramflex 50 Ohm RG8-X Cable. Length = 2 metres, Open Circuit. VF = 0.7856

3. Figure 2 shows the measured impedance, *Zoc*, of a sample of Tramflex RG8-X cable 2 metres long. The measurements were made with the AIM 4170 vector meter over the frequency range of 1 to 100 MHz. The cursor in Figure 2 was set at 41.343 MHz where the impedance levels are near the range of 50 Ohms (not critical). A similar chart for *Zsc* is shown in Figure 3. For this example, *Zoc* = 1.76 + *j*39.01 Ohms and *Zsc* = 1.16 – *j*70.06 Ohms.

The low value for the resistive portion of each measurement indicates that the cable has a very low loss. The resulting calculation using the above formula indicates that *Zo* = 52.29 –*j*0.75 Ohms. This compares well with the measurement made with an LC meter (see part I of the series) of 52.8 Ohms.

Measuring Velocity Factor

Another important parameter is the velocity factor which is determined by the dielectric constant of the insulator. Because the velocity factor is always less than one, the wavelength in the cable is less than the wavelength of the signal in free space. This in turn means that the physical length of the cable differs from the electrical length. The electrical length of a cable is its length measured in wavelengths (λ). The main use of the velocity factor is in cutting stubs for antenna arrays and in designing filters based on transmission line stubs. It is also used to calculate the input impedance at the terminals of an antenna given that we know the impedance at the far end of the cable. Velocity factor can be measured with a simple digital L-C meter, an SWR meter with impedance capabilities or more accurately with vector impedance meters. In this part of the series, the velocity factor is measured with the AIM 4170 vector impedance meter.

The velocity factor, VF, is defined as the ratio of the actual velocity (*v*) in the cable to the velocity of light (*c*) in a vacuum:

$$VF = v/c$$

The velocity factor can be measured accurately by measuring the input impedance of a cable that is open circuited on the far end. The frequency at which the input impedance becomes either a short or open occurs when the line length is an even or odd multiple of a quarter wavelength. As an example, an open cable that is one quarter wavelengths long looks like a short circuit while a an open cable that is two quarters of a wavelength long looks like an open circuit. VF can be calculated from:

$$VF = \frac{4 \times Len \times f n}{n \times c}$$

where $n = 1,2,3,4,5$ et seq

Where *n* is the resonance number. For *n*, 1 refers to a quarter wavelength, 2 indicates that the line is 2 quarters of a wavelength long and so on. The velocity of light in a vacuum is *c*, Len is the physical length of the line and *f* is the frequency. Consider an example of measuring a 2 metre section of RG8-X from Tramflex. The measurements using an AIM 4170 vector impedance meter are shown in Figure 4 where the input reactance of the cable is shown over the frequency range of 1 to 100 MHz. The reactance approaches infinity at very low frequencies as expected from an open circuit while the reactance equals nearly zero when the line is ¼ wavelength long. This occurs at 29.462 MHz, the first resonance where *n* = 1. Hence, *VF* = 0.7856 as calculated from the above formula.

Measuring Insertion Loss of Cables

The insertion loss of a coaxial cable is a measure of how much power is lost in the cable when it is operating in its matched condition (the load and signal impedance are equal to Zo). The insertion loss is given by:

Insertion Loss = 10log(*Pt*/*Pl*) dB

Where *Pt* [Watts] is the power transmitted into the cable and *Pl* [Watts] is the power that is received by the load. An insertion loss of 3 dB means that half of the power is lost in the cable.

One simple method of obtaining the insertion loss of your cable is to measure the SWR of a long section of cable that is open or short circuited at the far end. The formula below can then be used to compute the insertion loss. This seems to be simple but often the cable SWR will exceed the maximum range of the meter that you are using. This is usually the case if you are using a hand held meter that is designed to work with antenna tuning applications (low SWR). These meters are usually designed to produce accurate measurements for SWR levels around 2:1.

$$\text{Insertion Loss} = 10\log\frac{SWR + 1}{SWR - 1}\ \text{dB}$$

Consider a simple example of a 15 metre section of RG213 operating at 144 MHz. In this case the measured SWR will approximately 6.8. An SWR of 6.8 can easily be measured with a good vector impedance meter but is beyond the range of simple hand held meters. The Insertion loss in this example is 1.28 dB.

The Al1H Method of Measuring Insertion Loss of 50 Ohm Cables

The problem of using meters that cannot handle large SWR values has been addressed by Al1H (see TCA Hotlink,2). Al1H describes a method of measuring the insertion loss of cables that have a characteristic impedance of nearly 50 Ohms.

The method is applicable to hand held meters that are designed to operate in a 50 Ohm environment such as the MFJ 259B. This meter can measure the reflection coefficient ρ of a 50 Ohm system.

The solution is to put a 25 or 100 Ohm load on the transmission line instead of an open or a short. In this case the measured SWR will be around 2:1 for 50 Ohm systems which can be handled by most SWR meters. The idea behind this method is that the measured SWR would be exactly 2:1 if the cable was lossless but will be less that 2:1 in the real situation because of its attenuation. The method is:

Connect a 25 Ohm load (1%) to the far end of a long cable and measure the magnitude of the reflection coefficient, ρ. The cable should be long enough to make an accurate measurement of the cable loss. I usually use a length of about 15 metres for the HF bands. For example, the SWR of a 15 metre section of RG8-X at 50 MHz equals 1.7 with a 25 or 100 Ohm load. This value is within the measurement range of the MFJ259B meter.

Connect a 100 Ohm load (1%) to the far end of the cable and repeat the measurement.

Then, the Insertion loss is given as:

$$\text{Insertion Loss} = -5\text{Log}\rho_1\rho_2 - 4.77\ [\text{dB}]$$

continued on page 8

continued from page 7

Where ρ1 is the reflection coefficient of the first measurement and ρ2 is the reflection coefficient of the second measurement. Let's look at the example given by Al1H for Belden RG-58A cable that is 7.62 metres long and operated at 10 MHz. Here ρ1 = 0.316 and ρ2 = 0.299. Hence, the insertion loss from the above formula is 0.35 dB. This corresponds very closely to the calculation using TLDetails (see TCA Hotlink, 5) of 0.312.

It is interesting to note that RG-58A cable has a characteristic impedance of 53.5 Ohms, close to 50 Ohms. The measurement of two loads assists in improving the accuracy of the results when the *Zo* is not exactly 50 Ohms.

To use this method of cable loss measurements it is important to:

- Assure that your meter is well calibrated.
- Use 1% resistor values for the 25 and 100 Ohm loads.
- Use fairly long cables so that the cable loss is around one dB to improve the accuracy of the measurements.

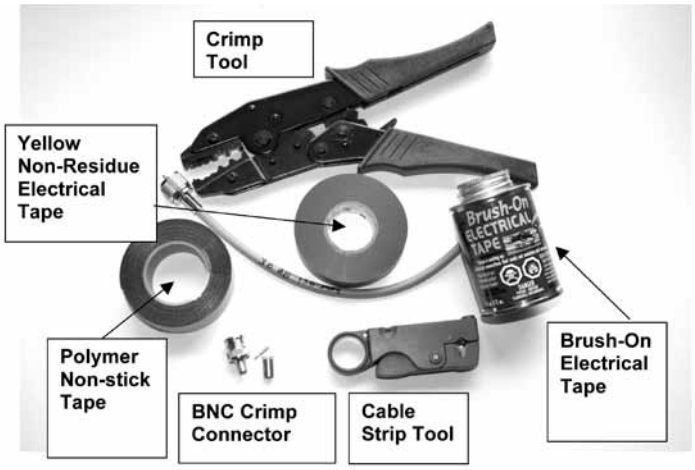
Connectors

The final item to consider when working with cables is the selection, assembly and maintenance of the connectors that you use for your system.

There are many connector types and variants that we can use. These include, BNC, F, N, SMA, TNC, UHF and mini UHF to mention a few. You can find a lot of information on Wikipedia about these connectors.

For rugged outdoor applications such as feeding antennas, the bread-and-butter connectors are N type and UHF types. N type connectors are waterproof but they are quite expensive. UHF connectors (see TCA Hotlink, 3) are used extensively by radio amateurs with good results through the 2 metre band. They are also used by most manufacturers of transceivers, antenna tuners and other equipment that you have in your radio shack. Hence, it is very easy to connect your radios directly to cables that use UHF connectors. Many amateurs use N type connectors for satellite antennas and applications for frequencies above 2 metres.

Figure 5. Connector Assembly Tools



These connectors can be attached to cables either by soldering or by using crimp type connectors. Both methods work well, but I usually use crimp connectors simply because they are extremely easy to work with. Greg Ordy, W8WWV (see TCA Hotlink, 4) has an excellent detailed description of soldering connectors. He includes a list of the required tools and several photographs of the assembly steps. I use his method and can recommend it if you decide to solder connectors. The crimping method requires the use of cable strippers and a crimping tool. Simple crimp connectors only use 2 parts and no center pins for UHF types. The tools that I use for crimp connectors are shown in Figure 5. To waterproof UHF connectors, it is best to use a small amount of brush-on electrical tape, no-stick polymer tape that is available at most hardware stores and a final covering with low residue coloured electrical tape. Crimping tools are available from many suppliers. If you purchase one, be careful that it works with your cables and connectors of interest.

Connector Performance

Some connectors such as N type have a constant impedance through the connector of 50 Ohms. These connectors perform well up to very high frequencies into the low microwave range. However, UHF connectors are not constant impedance and present a small reflection at each connector. Because of this apparent flaw these connectors have been much maligned by many radio amateurs. So, why do most radio manufacturers use these connectors up to and including the 2 metre band? The answer to this question is partially answered in Figure 6 where I show the SWR and Return Loss of a short section of cable with two UHF crimp connectors attached to the ends. The measurements show that the worst case SWR is 1.09 up to 50 MHz. This corresponds to and SWR of 1.04 per connector. The performance is slightly degraded at 150 MHz but even at that frequency the performance is acceptable for even critical requirements.

Use of VE3KL Cable Calculator

A calculator for *Zo* and *VF* of cables is posted on my web site for your use (see TCA Hotlink, 1). This is an Excel based calculator which has been tested for Excel 2003 and 2007.

The calculator includes the calculations for part I and part II of this series. Simply download the calculator and follow the instructions to the correct section.

Concluding Remarks

The performance of your radio system depends on three major components: the radio, the antenna and the cable that connects the radio to the antenna. Poor performance of any one of these components impacts on the overall quality of your radio system. Part I of the series presented simple methods that you can use to measure the quality of your cable system using L-C meters and digital multi-meters. Part II of the series went on to the use of vector impedance meters and hand held 50 Ohm SWR meters that have the capability of measuring complex impedance and reflection coefficient.

A calculator used to do the necessary calculations has been posted on the web site of VE3KL for your convenience. Another calculator that I strongly recommend is TL-details (see Hotlink, 5) by AC6LA. This calculator gives us a wealth of information about transmission line parameters such as loss and impedance of most commonly used coaxial cables.

Further Study Using TCA Hotlinks

Further information is provided with TCA hotlinks which are easily accessed via the RAC website. For this information, please visit <http:// www.rac.ca/tca>. Hotlinks make it unnecessary to type URL addresses into your computer and provide you with calculators and other support that demonstrates the ideas presented in the articles. The following hotlinks for this article are available on the RAC site.

TCA Hotlink, 1
Cable Loss Calculator VE3KL <http://ve3kl.com/>

TCA Hotlink, 2
Measuring Cable Loss Al1H Method <http://www.arrl.org/files/file/Technology/tis/info/pdf/0505qex044.pdf>

TCA Hotlink, 3
UHF Connector Description <http://en.wikipedia.org/wiki/UHF_connector>

TCA Hotlink, 4
Soldering Connectors <http://www.seed-solutions.com/gregordy/Amateur%20Radio/Experimentation/SolderCoax.htm>

TCA Hotlink, 5
TL Details by AC6LA <http://www.ac6la.com/tldetails.html>

Acknowledgement

I wish to thank Bryan VE3ZRK, for the generous loan of his MFJ 259B SWR meter for this study and for much assistance in the area of laboratory measurements and instrument calibration over the last several years.

Until later, VY 73,

David, VE3KL

Next deadline for copy is **10 July 2012**

How to buy a paddle key

By Phil Holliday ZL3PAH

When I was first licensed in the UK more than 40 years ago Morse was just a means to getting my license; I had to pass the 12 wpm test if I wanted to operate on the HF bands.

But I am afraid to say that once I had my ticket (G3UVZ) I operated on phone and RTTY (and in those days that meant real teleprinters; noisy, oily, wonderful machines, but that is another story entirely).

Then 20 years ago I emigrated to New Zealand and became ZL3PAH, but the time taken in starting and growing a business plus raising a family meant that there was no time for ham radio. It took an Elecraft K2 kit to rekindle the enthusiasm for HF and ham radio and again I was on the air. However the QTH was anything but optimal for antennas and SSB seemed out of the question. So I got out my old Morse key and went hunting for DX at the bottom end of the bands.

Hmmm... my Morse was so rusty it was embarrassing, and so with the help of various Morse programs on the PC I started to practice and started to make my first tentative QSOs. I found that I had lost the ability to use a straight key with any sort of accuracy, and instead resorted to a keyboard CW sending program. But I was not happy and tried a paddle; I bought an old Bencher on TradeMe® and found that with practice I could send near perfect Morse so long as the key itself did not move around the desk and stay in adjustment. But it did move all over the desk and the paddle adjustment drifted all over the place; it was literally just too light weight.

So the Bencher was pushed to one side. But I did want to persevere with a paddle, and looked at reviews on eham, and there was no doubt in my mind that what I wanted was a paddle from Begali in Italy, and although he makes some very expensive paddles they were within my price range.

Before I had to decide which model I would buy we (Maggie my XYL and I) decided that we would take a side trip to Italy whilst we were visiting the UK, and the area we were to visit was not too far from the Begali factory. A cunning plan formed in my mind and I emailed Begali to see if we could visit his factory and try some paddles. I had a reply immediately from both Piero himself and Bruna his daughter inviting us to the factory whilst we were there and to let them know our plans.

Having synchronised dates by email all was set. Having emailed our arrival date we arrived at the factory just after lunch time; the quad on the roof indicated we were at the right place and were warmly welcomed by Piero Begali and Bruna. Maggie went off for a chat with Bruna whilst Piero showed my round the factory.

The 'Officina Meccanica Begal'i company has been in business for 50 years and has always manufactured precision electro-mechanical components, particularly they had traditionally made precision parts for industrial knitting machines. However Piero told me that the Chinese manufacturers had taken virtually all of that business about 5 years ago; a too common story these days and he now only occasionally makes components for that industry. And he further told me that if it had not been for the fact that he made Morse keys and paddles as a sideline the business would no longer exist.

We looked around the factory and saw his numerically controlled milling machines carving out bases for different paddles and keys. And that is as close as I got to a paddle for the next couple of hours.

Piero is like many hams we all know, someone who likes sharing his passion for hobby, and who has blurred the distinction between hobby and business in the nicest possible way. We went upstairs to look at his station, looked at his historic collection of keys and paddles, talked about vintage equipment, particularly Geloso® of course as we were in Italy. Along the way he showed me a book he had written and signed and gave me a copy, saying that I would not be able to understand it as it was written in Italian. I am still not quite sure what it is about but suspect from the pictures that is tells part of the story of early Italian radio and Pietro's early days as an amateur.

Then it was time to have a drink and a bottle of wine appeared and we toasted each other, Italy and New Zealand, The All Blacks and the Italian rugby team (The Rugby World Cup was still in progress) and several other things which I do not remember.

Meanwhile Maggie was chatting to Bruna (I had worked out by this time that Bruna runs the business side of the operation and Pietro is the designer and engineer) and were getting along famously. Pietro's, wife arrived especially to say hello to the visitors and she was telling Maggie that her hobby is long distance motorbike racing and as far as we could understand she had recently taken 2nd place in a race.

I had said to Maggie before we arrived that we were just popping in to buy a paddle and that it would only take half an hour at the outside and then we could go and look around Verona. We had already been there for an hour already with no transaction in sight. About this time Piero put a cigar in his mouth and offered me one; I said that I thought they were bad for you and that I did not smoke. He told me he agreed and had been told you had thirty years from the day you started and as he only started smoking them last year he thought he was safe and with that he took out a blow torch which produced a fearsome flame and lit the cigar.

We spent a lot of time chatting but finally it was time to try a paddle and out came the whole range. They make something over 20 different models including straight keys, sideswipers, a bug and a whole swag of different paddles including spring and magnetic return, horizontal and vertical models, the range goes on. And they are breathtakingly beautiful if you are into this sort of thing; even my daughter, who I am afraid thinks that ham radio scores highly on the weirdness scale, thinks that my new paddle is gorgeous.

I tried them all; they all have a different feel and I spent a long time narrowing down my choice. I was very taken by several different models but there was one which I kept on coming back to because it felt so right and natural. So I finally chose a 'Pearl' and then was offered it plated in either nickel, palladium or gold. I got a gold one!

Bruna packed it up for me together with a bunch of QSL cards, an adjustment gauge, spare fingerpieces and a polishing cloth!

By the time we left we felt like part of the family, had invited the Begalis to stay with us if they get to New Zealand and had ourselves been invited back whenever we were in Italy. The afternoon had passed in a moment, I had a paddle and we both have wonderful memories of a special day spent with special people. βi

Musick Memorial Radio Station; Branch 86's Clubroom with a Million Dollar View

By Ann Walker ZL1BFB

In the late 1990's the South Auckland Repeater group was looking for a new home after commercial interests made it unrealistic to site the 145.775 repeater in the Sky Tower. Musick Memorial Radio Station at Bucklands Beach was at that time mothballed and an agreement was reached with the management permitting the repeater to be sited in the tower of the building.

ZLD front door.

Shortly afterwards, Branch 86 was also looking for a permanent home. Further negotiations with the Telecom representative at the time saw us installed on condition that we would keep the building in a tidy state. The building was filled with an incredible collection of old equipment, PO records, books and junk, much of it stored after a frantic clearance of the Oliver Road transmitting site before this building was bulldozed to make way for housing.

The first task was to clear the rooms. Most of these were quite literally totally full, in that there was only sufficient free space to enable the door to be opened. The clearance took several weeks and we were appreciative of the assistance given by other Auckland branches in this major effort. Walls, windows and floors were washed, furniture crockery and cutlery donated, and the task of sorting, cataloguing and disposing of rubbish (and furry things that went pitter patter in the night) commenced.

Work then started on the vintage equipment. Technical checks on the bigger transmitters and receivers sorted out the living from the dead and after some alignment and TLC many were made serviceable again. The 24V mains generator was found to be using a lot of current to charge 2 sets of cells, so this was switched off to conserve power. The batteries are now checked monthly to ensure that the charge is OK for operation if required. The 12V supplies are maintained and can be used to run most of the equipment. Restoration and maintenance of the vintage gear is ongoing as is work on the antenna systems.

Two donated lattice masts were installed on the former receiving antenna bases after we gained the appropriate consents from the Manukau City Council and Telecom. Aluminium panels were fixed to the lower part of the masts as a precautionary measure against climbers. Holes were drilled in the old concrete bases and bolts were set in with a fast curing resin. Then it rained. The ground became so waterlogged that we had to wait several months before the masts could be lifted into place. A vertical antenna has also been installed in the trees lining the drive. Noise from the rotary DC to AC convertors was overcome by installing a remote receiving antenna at the front gate. Subject to constant vandalism, this whip has been replaced several times.

A very large emergency generator which had been privately purchased was removed from the station. This involved unbolting the back wall of the generator room (formerly a garage and the only wall that was not 12″ thick concrete) lifting out the generator with a Hi-ab, then replacing the wall.

Installation of antennas was the next step, and we now have in place two steel masts at 18 m, both of which support a beam antenna, and also act as anchors for each end of the Vee antenna, which has its centre at the top of the tower on the building. There is an extensive earth system at the site and at the centre of this we have installed a vertical whip at a height of about 18 m. The latest installation was the 500 kHz 3-wire antenna stretching from the eastern to the western mast, a distance of 116m. This was put into service in March 2010 for the inaugural broadcast on 512 kHz utilizing the restored vintage Dansk™ transmitter.

Other antennas include two 3-wire dipoles, one on 40 m and the other on 80 m, as well as a trap dipole antenna which is suspended from the tower to each end of the building. Antenna tuners are connected to the 3-wire antennas which terminate on the ground floor at a modified cabinet converted to an antenna patch panel and change over system. This allows the operator upstairs to manually switch antennas without having to run up and down the stairs. The original extensive earth mats and conduits are still in place and we have taken advantage of this when siting the masts.

The first floor comprises 3 areas; 2 operating rooms and a "supervisors" room, which is where most of our meetings are held. One room houses the restored transmitters and receivers and the other a modern (relatively speaking) amateur desk, which now houses an ICOM 7700 and an ICPW1 linear amplifier donated by ICOM Japan. Members and visitors are welcome to bring their own equipment to use if they so desire. A long narrow room leading off the meeting room houses several working teletype machines which intrigue visitors.

The room on the second floor of the tower houses the 145.775 repeater and the recently acquired D-Star equipment. On the next floor, water tanks share space with a weather station and the recently installed 2 degrees® cell site equipment.

A well equipped kitchen contains everything necessary for the comfort and enjoyment of members, and the club barbecue is put to good use as often as possible.

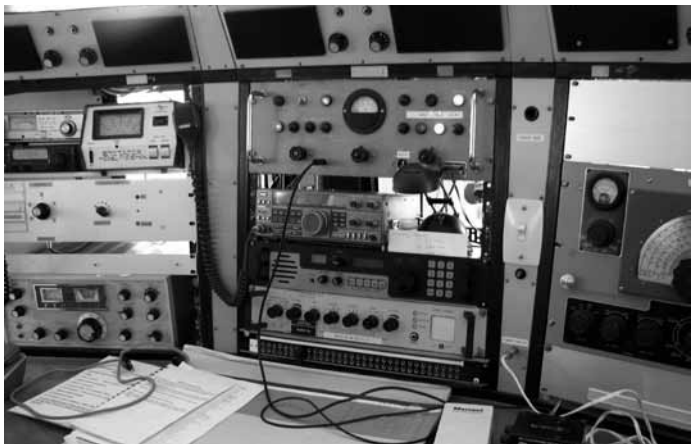
Downstairs are rooms dedicated to valve storage and magazine library, the former sick bay, which also houses several filing cabinets containing old records, a workshop where most of the restoration and maintenance takes place, a Telecom cell site base, the transmitter/aerial terminator rooms and power supply and battery rooms.

A room leading off the main foyer has been converted into a mini-museum displaying radio equipment which has been associated with the station in one way or another. In 2008 the club took over the running of the Northern QSL Bureau and the end room in the Western wing is now dedicated to sorting and distributing the regular delivery of 5kg packages of cards from Barry ZL2RR

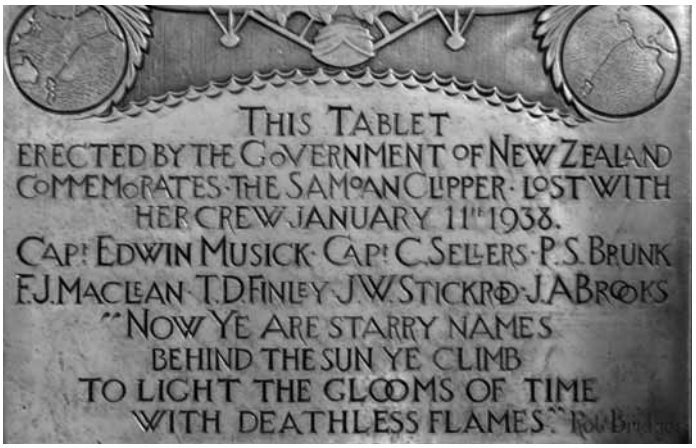
Built in 1940 the building is constructed in a unique Art Deco style, and is, as far as we are aware, the only coast station in New Zealand still capable of working. The massive front doors lead into a terrazzo floored memorial foyer dedicated to Captain Musicks achievements. Brass tablets on the walls bear testimony to his exploits and these are surmounted by two American Eagles cast into the concrete walls. The station is also a memorial to the New Zealand Post

Musick Memorial Radio Station (North side).

The vintage Dansk Transmitter used for the 512 kHz broadcast.



The vintage desk ready for th 512 kHz transmission.


THIS TABLET
ERECTED BY THE GOVERNMENT OF NEW ZEALAND
COMMEMORATES THE SAMOAN CLIPPER LOST WITH
HER CREW JANUARY 11TH 1938.
CAPT EDWIN MUSICK · CAPT C. SELLERS · P.S. BRUNK
F.J. MACLEAN · T.D. FINLEY · J.W. STICKRD · J.A. BROOKS
"NOW YE ARE STARRY NAMES
BEHIND THE SUN YE CLIMB
TO LIGHT THE GLOOMS OF TIME
WITH DEATHLESS FLAMES."

Memorial tablet to Captain Edwin Musick & crew in foyer of station.

Yasuo Ariyama ZL1JAP with Icom 7700.

An impronptu talk by Ian ZL1BFB to a walking group.

Office employees who volunteered as Coast Watchers in the Pacific during World War 2 and who were executed by the Japanese at Kiribati. A copy of the commemorative document for these men is displayed in the foyer. In 2010 the site attained Heritage status.

Early in 2011 it looked as though we would lose our unique call-signs, ZL1ZLD and ZL1ZLF, but timely intervention by the NZART ALO and a local MP saw their restoration; these were the original station call-signs, and have great historical significance.

Members are in attendance every Wednesday; a maintenance and construction group who have been nicknamed the "Last of the Summer Wine Group" and club meetings are held on the second Sunday of every month. This gives them every opportunity to utilize the wide range of equipment available

We believe an important part of our occupancy is to promote Amateur Radio, and to this end, we ensure that anybody enquiring about the station is handed a copy of the brochure detailing its history; this includes information on Amateur Radio, and the official promotional brochure from NZART. Although public access is restricted we are happy to welcome amateurs as visitors to the club and are able to arrange visits from groups after due consultation with Chorus, who are responsible for the management of the station. Its isolation also means that noise levels are low, and any generated QRM is highly unlikely to be a problem.

There are a few drawbacks. Small rooms, tank water and the main gate locked at 6 pm each night; but it is a clubroom which members take pride in, and do their utmost to continue put the building to the use it was intended for, namely Radio Communications.

The site is an ideal recreation spot. Swimming and golf are right on the doorstep, you can picnic, wander, get married and/or have your wedding photos taken anywhere in the extensive grounds, admire the view, or climb down the cliff staircase to fish from the rocks and beach below.

And, of course, if you're an amateur, you can also work the world. βi

Longer Wavelengths

Con Wassilieff ZL2AFP
<zl2afp@nzart.org.nz>

Noise reducing adaptive filters

In the last column I reported on my new noise-reducing filter program, which uses a variety of digital signal processing techniques (DSP) to bring signals out of the noise so that they can be heard and copied more clearly. This time I thought I might discuss "how digital filters work", in particular the Least Mean Squares (LMS) noise reducing filter which seems to have such magical properties. The LMS filter is a form of "adaptive filter". In order to understand this filter, it is necessary to understand how an ordinary filter works. In the subsequent discussion the input (analogue) signal is assumed to be digitised into individual samples which are held in an array of two samples called Input_buffer().

Digital filters

There are two basic types of digital filter: Finite Impulse Response (FIR) filters, which are basically moving-average filters; and Infinite Impulse Response (IIR) filters, which feed some of the output back to the input and act a bit like a Q-multiplier (if anyone remembers what they were).

These exotic-sounding names are in fact quite descriptive. If you feed a transient (pulse) into an FIR filter it will simply decay away at a rate determined by how much averaging is involved in the filter, and the response of the filter to a transient lasts for a finite time.

Because an IIR filter uses feedback, there is a possibility that it will become unstable when fed a transient and go into oscillation, or worse (ie it will keep going for an infinite time).

FIR filters are unconditionally stable and can be designed to have no waveform distortion and the filter shape can be pretty much anything you want, subject only to the choice of coefficients (or "weights") comprising the filter. The operation of an FIR filter is pretty straight forward. Let us make a filter which takes two adjacent samples and averages (or sums) them together. It does this every sample and replaces each sample with the average (or sum) of itself and its neighbour. High frequency detail is removed by this process and so we have a simple low-pass filter. Input data are "smeared" out. The value of both filter coefficients is 1. In analogue terms this would be a simple RC filter.

If we now take the difference between two adjacent samples we retain high frequency detail but eliminate the low frequency information. This is easy to see if we make all samples the same (eg. a DC signal) in which case the difference between any two adjacent samples is zero. So now we have a high-pass filter. The value of the two filter coefficients is now 1 and -1. In analogue terms this would be a simple RC filter but with the R and C reversed.

The equation representing the action of our FIR filter is

Output(i) = C1*Input_buffer(i) + C2*Input_buffer(i+1)

Where C1 = 1, C2 = 1 for a low-pass filter and C1 = 1, C2 = -1 for a high-pass filter. In practice the coefficients will already be normalised so that the amplitude of the output signal does not increase with increasing numbers of coefficients. In this example they would be 0.5 and -0.5 respectively. The sample number i is stepped through a block of data such as is held in a soundcard buffer for example. A block of data can also be inside a file. The sampled data are fed into the filter routine one sample at a time.

Filter coefficients are sometimes referred to as "taps". This comes about because a digital filter implemented in hardware uses shift registers (delay line) with taps (like taps on a coil). The signal to be filtered is clocked into the shift register from the left and each subsequent sample in the shift register is moved along one place to the right. Figure 1 demonstrates this process with our filter above, consisting in our hardware analogy of a shift register of 2 elements.

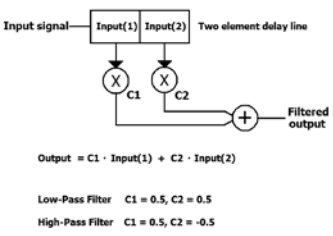


Figure 1. Two-element tapped delay line.

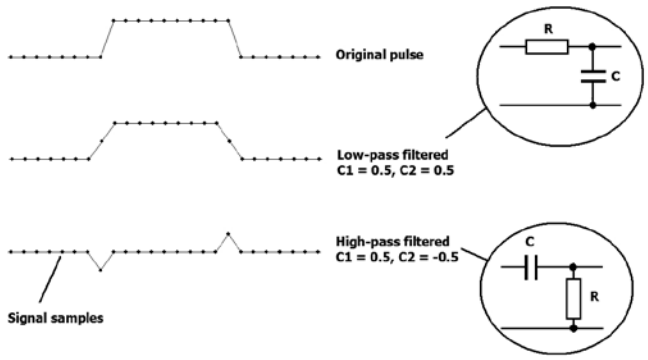


Figure 2. Response of a rectangular pulse to the two-coefficient filter.

I have used a filter of only two coefficients as an example, but the "sum-difference" analysis method of pairs of samples appears in other types of filters, such as the Fast Fourier Transform (FFT), and Wavelet analysis. But that is another story.

Figure 2 shows the action of this equation on a rectangular pulse. Because we have a filter with only 2 coefficients, the low-pass filter effect is not very spectacular but the high-pass filter effect is very clear. The filtered pulse appears to start one sample earlier than the original pulse but this is an artifact of the equation and presentation of the data.

The degree of filtering can be adjusted by varying C1 and C2, in the same way that a simple RC analogue filter can vary the time constant by varying R and C individually, or together. By using more coefficients and including positive and negative values, band pass or band stop filtering can be achieved. In fact any sort of band shape can be achieved by adjusting the coefficients in an appropriate manner.

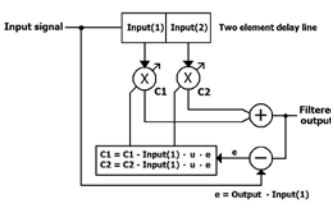


Figure 3 – A simple LMS filter.

Adaptive filters

Which brings me to the "adaptive filter". If the coefficients can be adjusted each time a new sample is clocked in to the shift register (or the software version), the filter will be able to respond rapidly and random noise will be able to be filtered out. This adjustment is done by comparing the output of the filter with the input, and varying all of the coefficients to minimise the difference between output and input. The adjustment algorithm commonly used for this purpose is the Widrow-Hoff Least Mean Squares (LMS) algorithm. The basis of this algorithm is that the rate of change of the square of the difference between output and input is minimised, and this leads after a bit of calculus (isn't that some sort of tooth disease?) to the little equation in figure 3.

The factor 'u' in figure 3 is a fixed scaling coefficient (typically 0.01 or smaller) to make sure the whole thing does not take off, among other things. The value of 'u' also affects how fast the filter converges to a stable result. In practice there are a few other improvements to the very simple algorithm in figure 3, such as a "decorrelation delay" applied to the input to help improve the performance of the filter, and a "leak" factor to ensure the filter does not get "stuck" on bursts of noise. In the example of figure 3 there is no decorrelation delay and so the first sample in the buffer, Input(1), is the input sample at that time. Input(2) is the previous sample, and so on if there are more coefficients. Typically the decorrelation delay only needs to be 1 sample.

What happens with this filter is that when the input signal is entirely noise-like, with no correlation

between the samples, the LMS algorithm eventually sets the coefficients C1 and C2 to zero (or at least as low a value as can be achieved with a filter with only two taps). When a slowly varying signal comes along, the algorithm immediately senses that there is a strong relationship (correlation) between adjacent samples and sets the coefficients to form a sharp pass band at the frequency of the incoming signal. So the filter does not filter out noise, rather it reduces the gain of the filter when only random noise is present.

What does it look like in program source code? Figure 4 presents a code listing of an LMS filter in BASIC syntax. Note that the first part is the plain FIR filter part (implementing the circuit of figure 1), with the second part updating the filter coefficients ready for the next sample to arrive.

I did promise in the last column to write a few pieces on programming in C so here is the above code in C syntax. Not much difference, apart from square brackets and semi-colons. I have omitted the comments for brevity. Note that the arrays start at 0 index rather than 1 index as I have used in the BASIC code.

In the code listing the output of the filter can be either the signal without reduced noise (this is the term "filter_output") or else the noise without the desired signal (essentially a "notch", which is the term "E"). In fact the filter in notch mode will filter out all sinusoidal or slowly varying signals and leave only the random noise.

In practice the number of coefficients is variable, to make the filter useful over a wide range of signals. The more coefficients the better the noise reduction, but too many coefficients will make the filtered signal sound "woolly" as if it has been passed through a filter that is too narrow, which it is. Varying the value of u also varies how quickly the LMS algorithm converges to a new value and this also affects the sound of the filtered signal. It is all dead easy to do in software.

Titanic event

A special broadcast by the Deutscher Wetterdienst (National Weather Service) transmitter DDH47 on 147.3 kHz was scheduled for the 14 of April beginning at 22:30 GMT. Not surprisingly nothing was seen or heard at my QTH.

```
REM Input a sample and put it in the first input buffer location
       input_buffer(1) = input_sample

REM Calculate the output based upon current filter coefficients
REM and input values currently in the input buffer
REM First initialise output to zero
       filter_output = 0

REM Calculate the filter new output value
       FOR i = 1 TO number_of_taps
          filter_output = filter_output + c(i) * input_buffer(i)
       NEXT i

REM Calculate difference between input and current output
       E = input_buffer(1) - filter_output

REM Update all of the coefficients based upon the new value of E
REM and the samples in the input buffer
REM The 0.99996 is a "leak" factor that prevents the filter "sticking"
REM on strong signals
       FOR i = number_of_taps TO 1 STEP -1
          c(i) = 0.99996 * c(i) + u * E * input_buffer(i)
          input_buffer(i+1) = input_buffer(i)
       NEXT i
```

Figure 4. LMS filter source code in BASIC.

```
input_buffer[1] = input_sample;
filter_output = 0;

for (i = 0; i < number_of_taps; i++)
   filter_output = filter_output + c[i] * input_buffer[i];

E = input_buffer[i] - filter_output;

for (i = number_of_taps-1; i >= 0; i--)
   {
   c[i] = 0.99996 * c[i] + u * E * input_buffer[i];
   input_buffer[i+1] = input_buffer[i];
   }
```

Figure 5. LMS filter source code in C.

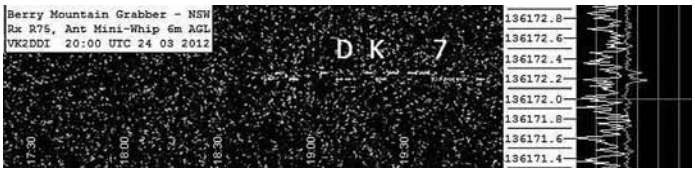


Figure 6. Spectrogram capture at the VK2DDI grabber.

600 m net

Thursday evening 600 m net has returned to weekly operation, with the co-ordination net on 3666 kHz starting at 8.30pm. Recently, 600 m transmitting stations have been down to two (ZL2T and ZL3EE). Propagation conditions on 600 m have been very variable, with some Thursdays having virtually no copy either by ear or visually using Argo. On other occasions, propagation was quite different with ZL2T receiving S7 and S8 reports from North and South Island stations. Conditions on 80 m seem to bear little relationship to those on 600 m. Bob ZL2CA has commented that it could be that 600 metres has the most variable conditions of any band that can be accessed with an amateur radio qualification.

DK7FC received in VK

The DFCW-180 transmission on 137.172 kHz by Stefan DK7FC was received by the on-line grabbers of VK1SV and VK2DDI on 24 March 2012 at around 2000 hours UTC. This is a distance of over 16 000 km and must represent the best DX so far for this frequency. DFCW-180 is a dual frequency shift mode with dash length of 180 seconds. Upper tones are "dashes", and lower tones are "dots" of morse code. The frequency shift is only 0.1 Hz. Figure 6 shows a section of spectrogram from the VK2DDI grabber showing a partial reception of the callsign. The time of reception coincided with the time of Stefan's transmission so the reception is acknowledged as being from DK7FC.

Two-way QSO on 8.97 kHz (26 March 2012)

Another first has been achieved on VLF, this time a two-way QSO between Lubos OK2BVG and Markus DF6NM, on a frequency of 8.97 kHz. This is over a distance of approximately 424 km. The mode used was MFSK-37, with 30 minute dashes and 37 possible tones, each representing a character. Each tone is only 1 mHz apart so precise frequency stability and a resolution of 0.45 mHz at the receiving end was required.

Characters are identified by reading the frequencies above 8970.000 Hz, with 8970.000 to .009 assigned to the numbers, 010 idle or space, and .011 to .036 the letters A-Z. OK2BVG used a Rubidium standard to lock his transmit sample rate, while both receivers and the DF6NM transmitter were synchronised by military MSK signals from GQD (22.1 kHz) and DHO (23.4 kHz). Radiated power from top loaded vertical aerials was around 10 to 15 microwatts.

With single-letter suffixes, the message sequence was as follows:

07:30-08:30 "NB" ;Lubos' call: df6Nm de ok2Bvg

09:00-10:30 "BNM" ;Markus' reply and report: Bvg Nm M

11:00-12:00 "RO" ;Lubos' confirmation and report

12:30-14:00 "RTU" ;Markus' confirmation and thank you

This is somewhat analogous to an EME QSO, although lasting 5.5 hours. Exciting stuff!

WANTED: copy for *Break-In*

My stock of articles etc for future issues is running low so I appeal to members to assist with material for publication. This could be short or long articles on any topic related to amateur radio and electronics, constructional articles, book reviews, equipment reviews, software reviews, branch activity reports, etc.

I should also like to receive articles on electronics related topics such as auto-electronics, home sound systems, workshop practice; in fact anything that hams might find of interest. Thanks and 73, *John R L Walker ZL3IB (Editor)*

Email <zl2tw@nzart.org.nz>

QRP Communications

by Richard Smart ZL4FZ

Portable operation has been an interest of mine for some time now. My previous employment with Kordia meant that I had the opportunity to go to parts of New Zealand that were sometimes not generally accessible to the public. On some of these trips I had taken my FT-897D HF radio, some wire and an antenna tuner with me to make the most use of these locations; although this did occasionally cause a degree of amused head shaking from my colleagues. In this way, from time to time, I have been able to operate from some 'rare' squares for those who were taking part in the Maidenhead Squares award, and also to work some interesting (although not necessarily rare) DX.

During these early forays, I used a half-wave dipole on 80 m and a 1:1 UNUN to connect the between the antenna and the coax to the tuner. This worked quite well on 80m; tolerably well on 40 m and OK on 20 m. Options to gain any sensible height for the antenna were almost always limited, with a typical maximum height of 2 m being the best. Despite this a number of good contacts were made from locations as diverse as D'Urville Island (Attempt Hill) in the Marlbourgh Sounds and Mt Mary in the McKenzie. However these contacts were all made using 100W PEP and this meant taking along a reasonable sized battery; in this case a second-hand 24A/hr gel battery.

Low power portable operation

More recently I was able to purchase a second-hand FT-817 QRP radio. The FT-817 is an all-mode, 160m through 70 cm radio. Maximum power is 5 W pep with a self-contained battery, either Ni-Cd or Ni-MH. On the internal battery the transmitter defaults to 2.5 W pep although this can be over-ridden if needed.

The great thing about the FT-817 is that it is really quite small; small enough to put into a backpack and carry about. However the portability raises another problem; a suitable antenna? At home I have successfully used a 30 m doublet with open wire feed line. This is connected to a 4:1 current balun and a short coaxial cable into the shack. This particular arrangement is capable of working on most of the HF bands with a suitable antenna tuner.

The doublet and open wire feeder option appeared to be a workable option for portable operations, so I spent a morning assembling one similar to the permanent antenna at home. The centre section is made from a PVC 'tee' section and some low cost joining links to provide a centre insulator that can support the open wire feeder. The two 15 m legs have been fitted with eyelets and small shackles to make the antenna easy to assemble and disassemble, yet light weight and small enough to pack away into a small bag.

A LDG Z817H automatic tuner completes the portable station allowing operation on almost all HF bands.

First contact…

The first portable contact came about because of the coast-to-coast event in February this year. Being required to start very early on Saturday morning, Don ZL3DMC and I elected to stay the Friday night at a camp site just above the Waimakariri River Gorge Bridge. Arriving in time for the Awards net on 3677 kHz, we quickly erected a low height antenna and made a number of successful contacts with stations between Christchurch and New Plymouth (at 2.5 W).

After the net, we took a few minutes to have a listen on 20 m. A strong Swedish station was heard at which point Don provided encouragement with 'that rigs got big ears, but a small mouth; no chance he will hear you". The Swedish station was calling CQ DX Pacific, so I called. Nothing! He called again and I replied again. Then a response "The ZL4 station again" he had heard us. After a frequency shift to avoid some QRM in Europe a short but successful QSO was held with signal reports of 5x9 sent and 5x7 received; not bad for 5 W and a (low) dipole.

QRP HF Digital Email.

HF email screenshot.

On a more recent trip to Franz Josef Glacier, I received a 5x8 report from Sydney using 2.5W and the new 30 m doublet. This time I was only able to get the antenna 1 m above ground (where are the trees when you need them) so I was very surprised at the good report.

Most recently at Lake Wanaka, I was able to get the antenna up to two metres above ground between two trees. F5BAU was calling and after several attempts he responded. Initially he thought the conditions between ZL and F were not that good, but when he realised that the transmitter at this end was only 5 W a good QSO ensued. The reports were 5x9+ sent and 5x1 received.

Also at Lake Wanaka, I took the time to connect my laptop and retrieve email using the Winlink RMS Express software[1]. Email contact established, using 40 m and 2.5 W. Because I was operating on the beach front, the setup certainly attracted some attention and interesting conversation with an American student currently in NZ on his OE. Although he had heard of Amateur Radio, this was the first time he had ever seen anything like this.

So what's the attraction?

It is definitely a sense of achievement to make contacts overseas or throughout New Zealand using very low power and a moderate antenna. More often than not, these contacts are made from temporary locations, which are electrically very quiet, so not having to fight the noise that pervades the city environment makes the contacts much more enjoyable.

I am prepared to accept that I will not be able to complete in the DX pileups, although I must admit that a number of DX operators have been very patient and encouraging when discovering that the ZL they are working is a QRP station.

Antennas for QRP need thought. Antenna design is always

The World Radio Conference 2012

by Don Wallace, ZL2TLL, Administration Liaison Officer

After 4 weeks of Plenary, Committee, Working Group, Sub-Working Group and Drafting Group meetings, WRC 2012 is now over. This report gives a brief summary of items that I think may be of interest to NZART members.

Proposed 500 kHz (or 600 metres) Allocation

As most NZART members are probably aware, WRC 2012 agreed to a worldwide Amateur secondary allocation from 472 to 479 kHz. This is less that we were seeking and the power level is less than what we currently have in NZ but the important thing is that there is now an international allocation with the potential to allow communications between a much larger number of countries than presently have access to this band.

Please Note: This does *NOT* mean that NZ Amateurs automatically have access to this frequency range in NZ; there will need to be discussions with the MED regarding how and when it is implemented.

Thanks are due to the many people who have contributed to this successful outcome – and in particular to Peter Lake, ZL2AZ, who has been involved from the very start.

Proposed Oceanographic Radar Allocations

Another item discussed at this 2012 conference was allocations for Oceanographic radar in various bands from 3 to 50 MHz. While none of the proposed allocations were in established Amateur bands, one of the proposed band segments overlapped frequencies around 5 MHz where some countries currently have been allocated either a band or individual channels.

After a very drawn out series (20+) of drafting group meetings, the final bands were agreed. Unfortunately this still includes an allocation (secondary in Regions 1 and 3, primary in Region 2) from 5.250to 5.275 MHz. This will need to be taken into account when considering the proposed future worldwide 5 MHz amateur allocation: see below.

Proposed 2015 Agenda Item. Potential 5 MHz (or 60 metres) Allocation

A paper from Cuba proposed that an allocation to Radio Amateurs around 5 MHz be included on the agenda for the next WRC. The NZ Delegation supported this each time it came up and, despite predictions to the contrary, the WRC 2012 decided to include it in the 2015 agenda, resolving to invite WRC 15 to consider:

- the possibility of making an allocation of an appropriate amount of spectrum, not necessarily contiguous, to the amateur service on a secondary basis within the band 5 250-5 450 kHz.

This is, in my view, a very positive outcome but I think, based on the amount of discussion on the oceanographic item, and the attitudes some countries have to Amateurs, we will have to work very hard to turn this into a "real" allocation.

Other WRC 2015 and WRC 2018 Agenda Items

Included in the agendas for WRCs 2015 and 2018 are a number of items that have the potential to affect our current allocations:

- An agenda item for 2015 proposing a primary allocation to vehicle radar at 77.5-78 GHz – where we currently have a primary allocation;
- Two agenda items for 2015 posing potential threats to our allocation at 10 GHz;
- An agenda item for 2015 posing a potential threat to our allocation at 24 GHz; and
- An agenda item for 2018 regarding (commercial) micro and pico satellites which currently tend to use (and may want to continue using) Amateur frequencies.

As the work for WRC 2015 progresses, these threats may disappear and/or other threats may appear – we will need to carefully monitor the preparatory process.

Budget

Members will, no doubt, be pleased to hear that the costs to NZART of my attendance at WRC 2012 were well under the budget approved by NZART Council.

Thanks

I would like to thank NZART Council for supporting my attendance at WRC 2012, the NZ Government for including me in their delegation, and the large number of other people who have contributed, formally or informally, to the matters discussed above; it would not be possible to carry out my role without their support. βi

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a compromise between size, frequency agility and weight no matter what service you are designing for. QRP operators often want all of these at once, light weight (for portable operation), high efficiency because of the low power, frequency agile to make the most of the band openings. Obviously there is no single answer to all of the above and every operator will have their own favourite solution. In my case, I elected to use a wire doublet with a short open wire feeder, balun and tuner. This antenna is quite easy to erect, but sometimes finding trees 30 m apart is harder than it looks. The next iteration may well change the current open wire feeder for a smaller ladder line which would be a little bit lighter to carry. Irrespective, antenna choices are part of the attraction, and the difference between good bad and indifferent can have quite a large impact on the success or otherwise of one's efforts.

QRP operation is a choice and not always the best option for a particular time or need. Sometimes the best solution is simply more power, but for those times that low power is an option it can be a great deal of fun to make the most of what the ionosphere has to offer.

Other QRP options

Digital options such as PSK-31, Domino-Ex Digital E-Mail modes and others can also improve the apparent reach of a QRP station. When I am more confident with my CW I intend to pursue some of the CW openings that are available as well.

For those interested in designing or building their own equipment, QRP offers an opportunity to build small transmitters and good receivers with specific capabilities in mind.

All in all QRP operation is another part of the hobby, a part where some of the information we take for granted needs greater attention and planning to be successful. Of course applying what is learnt in QRP operation to normal (higher power operations) may well result in improved results there as well. βi

Reference

[1] See <www.winlink.org> for software and email over HF details

NZART needs YOU in 2013

NZART Conference held over Queen's birthday weekend each year is hosted by branches nationwide.

Council is urgently seeking a branch, or combined branches, to host the 2013 annual conference. Can your area help?

If so please contact Debby at HQ for further details.

The Morseman

Gary Bold ZL1AN
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The Wreck of the Titanic

As I write this, it's 100 years, nearly to the hour, since the *Titanic* vanished almost vertically into the sea. The news that this immense ship had gone down after a collision with ice in just over 2 hours on its maiden voyage was almost inconceivable. (only later was *Titanic* designated "unsinkable" in the popular press) See a FAQ document[1], which give the background, and Paul Lee's analysis[2] of the whole event. This is very detailed, gives complete wireless messages, and discusses various inconsistencies in accounts of the survivors. A BBC documentary, with complete message traffic spoken verbally can be downloaded as an mp3 file.[3] Another overview can be downloaded from the *Titanic Radio Page*.[4]

You can read and hear all this yourself. I want to discuss the wireless equipment. There is much less information about this, and a lot of what's on the web is wrong.

The chief wireless operator was Jack Philips, his assistant Harold Bride. Only Bride survived. At the time of the collision with the iceberg, estimated at about 11.50 pm on 14 April 1912, they'd sent and received about 250 telegrams in the 36 hours since leaving Southampton, and also had to repeatedly repair a high-voltage insulation fault. Both were exhausted.

The Titanic's Transmitter

Figure 1 shows an authentic, but rather daunting schematic of the *Titanic's* wireless equipment. The Marconi transmitter utilised a "5 kW synchronous rotary spark-gap". This was a new design, and the only one then fitted to a ship. The generally accepted working range at this power was "about 250 miles during the day and up to 2000 at night, depending on atmospheric conditions", but Bride said at the subsequent inquiry that they achieved "more like 400 miles during the day" due to this new spark-gap's superior noise penetration.

This spark-gap is in the centre of the schematic, labelled "discharger". A photo of what was actually installed is shown in figure 2. At left is an electric motor, run from the ship's 100V DC supply, which drove a 5 kV AC alternator at centre which produced nominally 300V at 70 Hz (apparently not 60). This was stepped up to 5 – 10kV (accounts differ) by a transformer, and was then applied across the spark-gap.

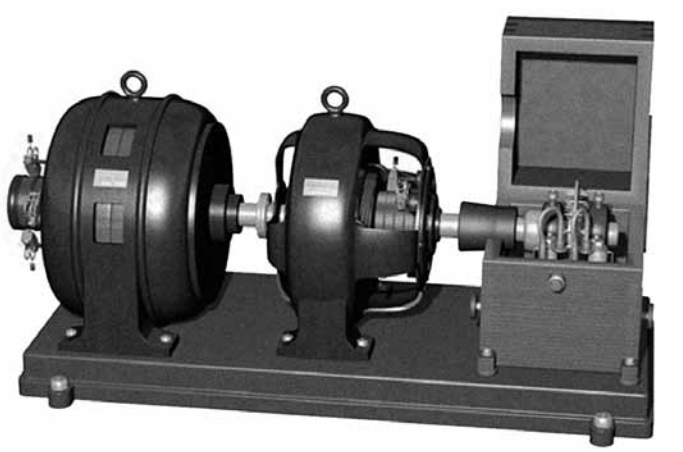


Figure 2. Titanic's alternator and rotary spark-gap.

Bruce Beverage's definitive book[5] states that the alternator shaft rotated at 2100 rpm, and also spun the rotary spark-gap's circular plate seen in the box at right. Sixteen protruding contacts on this plate's perimeter rotated through the gap between two fixed contacts mounted on the frame. A spark formed, jumped between them, and was rapidly damped on each pass. Since there were 35 rotations/second, and 16 sparks per rotation, the resulting spark rate was 560 Hz. Nobody now alive can tell us what this transmission sounded like, but it has been variously described as a "raspy, musical note" and also a "whistling, high-pitched tone". The discharge was very noisy, so it was enclosed in the lead-lined, acoustically insulated box shown, and installed in an adjacent "silent room".

In the July/August 2011 column I referenced a "Deleted scene" from the *Titanic* movie, which contains many errors[6]. A simple two-electrode spark-gap is repeatedly shown, energized apparently by an induction coil. The Morse is gibberish, and Phillips is depicted sending, with an expletive-laden outburst, the phrases "Keep out! Shut up!" to the *Californian*, whose strong signal was interfering with his telegram traffic. In fact, Phillips sent the procedural signal "DDD", the currently defined international request to "keep silent", which was loosely translated at the American inquiry by Marconi as "shut up". Cyril Evans, the *Californian's* operator, stated at the British inquiry that he was not insulted (as wrongly depicted in the movie) by this as "the larger or faster ships always took preference in sending traffic".

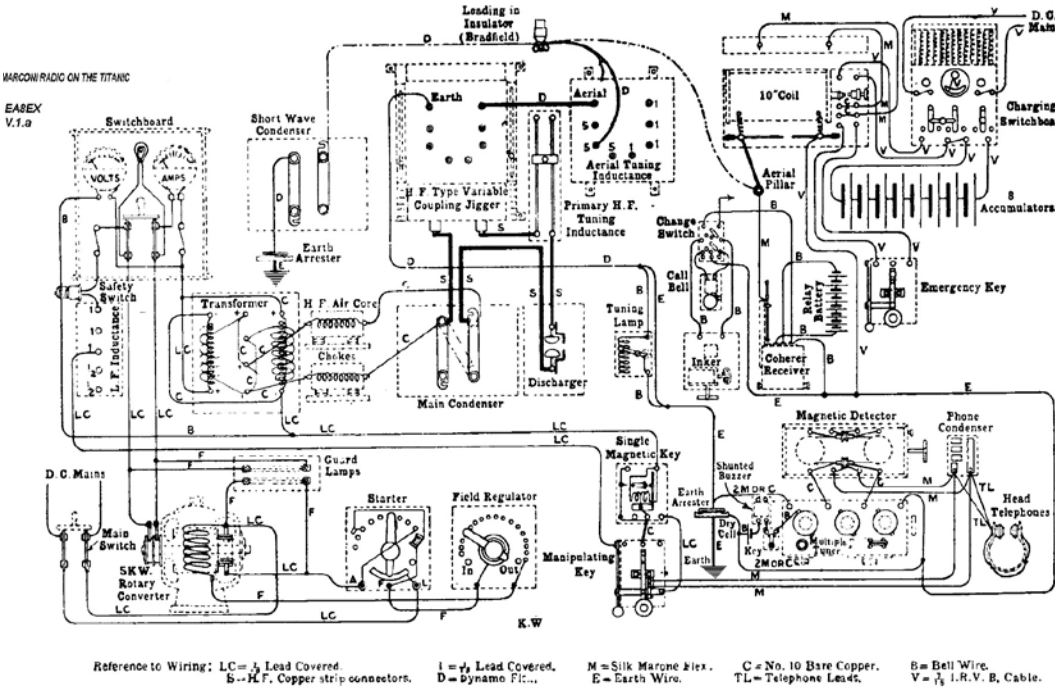


Figure 1. Schematic of Titanic's wireless equipment.

Why a Rotary Spark-gap?

The earliest spark-gaps had two fixed contacts. A spark jumped whenever the applied voltage between them exceeded the gap break-down voltage; about 3 kV per millimetre. An intensely hot, ionized path of low resistance then formed, connecting a charged capacitor across the inductor of a tuned circuit. The resulting explosive discharge of the capacitor's energy initiated a transient oscillatory waveform which was coupled, by mutual inductance, to a secondary circuit which included the antenna. Both primary and secondary circuits were tuned to the nominal transmitting frequency, 500 kHz. The ionized spark path remained conducting until the voltage dropped to the gap's "quenching" voltage, which was much lower than its initial break-down voltage, when it became open-circuit again.

To maximize the power transferred

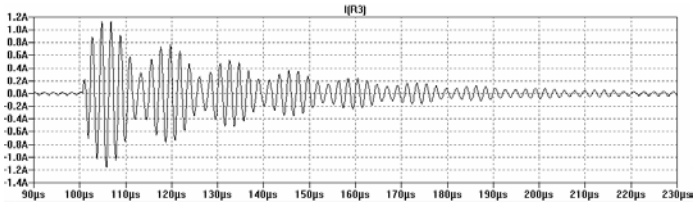


Figure 3. Simulation of over-coupled spark waveform.

to the aerial, high mutual inductive coupling was required. This is specified by the coupling coefficient, *k*, defined as $k = M/\sqrt{(L_1 L_2)}$, where L_1 and L_2 are the primary and secondary inductance and *M* is the mutual inductance. If k exceeds the "critical value", given by $k = \sqrt{(1/(Q_1 Q_2))}$, where Q_1 and Q_2 are the Qs of the primary and secondary circuits, the frequency response of the mutual transformer becomes "double humped", with two peak frequencies, above and below the nominal tuned frequency, which move further apart as k increases. This results in a radiated waveform containing "beats".

Figure 3 shows an *LTspice* simulation illustrating this, using reasonable component values. Both primary and secondary of the mutual inductor resonate at 500 kHz. At start-up, the 1000V battery at left charges C_1, the primary capacitor. The diode (I just selected a suitable one) and voltage generator then short the left-hand side of C_1 to ground, simulating the spark gap turn-on. The coupling coefficient *k* is 0.15, about 10 times the critical value. The resulting transient response current in R_3, representing the aerial, is shown in the top pane. The beats show that there two predominant components present, and Fourier analysis gives their frequencies as 477 and 524 Hz.

This waveform was unsatisfactory for several reasons. Firstly, signal detection theory shows that for optimum SNR, all of the energy should ideally be at a single frequency, or at least concentrated in the smallest possible bandwidth. Secondly, sparks initiated like this showed considerable randomness in their repetition rate. Thus the radiated waveform was incoherent, and was received as a "noisy hiss", difficult to perceive in the noise background. Thirdly, the beating, over-coupled waveform took some time to decay to the quenching threshold of the spark gap (probably after the 4th beat in the waveform shown here), so that the latter part of it contributed little energy, and just delayed the onset of the next spark, thus reducing the average power.

The rotating gap, powered by an alternator, addressed all these problems. Sparks formed and were extinguished rapidly as the moving contacts passed the fixed contacts, allowing no time for beats to form. Because of the rotary shaft's constant rotation rate, the spark repetition rate was also constant. The signal thus formed was coherent, and was perceived as a harsh tone, much easier to distinguish in the background noise.

I've been unable to find values for the inductors and capacitors used in the Titanic's wireless. Can anyone give information? If the spark gap ran at 5 kW continuously, each spark would have released about 9 Joule. To appreciate this, charge a 100µF capacitor to 425V, and short it out. Then imagine this happening 560 times/second.

The Titanic's signals

The first international "distress" signal defined was "CQD", or "Calling all stations, distress". But in practice it had been discovered that since many operators ran words together (and still do, particularly with call-signs) "CQ DE MGY" could be received as "CQD...", causing false alarms. So a new signal had just been introduced: "SOS", sent as one symbol with no spaces, repeated 3 times. All audio simulations on the web I've heard get this wrong, depicting it as separate 3 letters.

Phillips initially sent "CQD", but Bride remarked jocularly that he should send "SOS" as well, since "it may be your last chance to send it". At the time, the ship was stopped, but both operators were relaxed, still believing that after minor repairs they would be under way again. Two hours later, both would be in the freezing water, one would die, and the ship would be gone.

Phillips sent his first call at 12.15 am. Over the next two hours, his transmissions became increasingly desperate as the magnitude of the disaster became apparent. The transcripts show much confusion. At 1.48 am Phillips, tired and reportedly unwell, grows irritated with the operator on the *Frankfurt*, about 170 miles away, who persistently interrupts the emergency traffic, sending "What is the matter with u?" Philips replies "You fool, stbi and keep out". At 2.17 am, the *Virginian* hears his last, weak signal, which ends abruptly as water floods the wireless room. The ship founders approximately 3 minutes later.

See a video of a similar synchronous spark transmitter on the web[7]. This site also has an audio simulation of how it would have sounded; except that the frequency is too high, the Morse is too fast; an ear-witness reported that Phillips sent at about 15 wpm and the spacing of the SOS, as noted above, is wrong.

The Titanic's receiver

The receiver utilized both coherer and magnetic[8] detectors, essentially "crystal set" technology. Glimpses of the magnetic detector can be seen on the wall above the operating table in the video clip. Several references state that a "Fleming valve receiver" was also installed, but the schematic does not show it, and I can find no description of it anywhere. Has anyone any information?

Reception was by headphone only, with no amplification. Anecdotes of the time say that many operators developed "cauliflower ears" from pressing the 'phones hard against their heads to hear faint signals better. There was no AGC or highly selective tuning either, so signals from many stations were audible simultaneously, and those from those nearer could be deafeningly louder than those from further away.

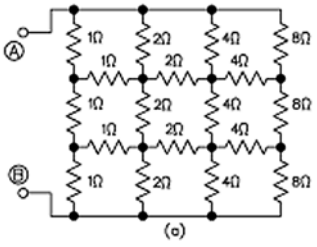
The inquiries

After the disaster, inquiries were held in both America and Britain, and full transcripts of proceedings are on the web[9]. The American accounts are particularly riveting. I recommend that you read, in particular, the verbal testimony of Harold Bride on day 2, and his written account on day 14. Many others of the crew and passengers were interviewed, and the conclusions of the American commission of enquiry are sobering. They contain these statements:

"So confident were they, that both owner and builder were eager to go upon the trial trip; no sufficient tests were made of boilers or bulkheads or gearing or equipment, and no life-saving or signal devices were reviewed; officers and crew were strangers to one another and passengers to both; neither was familiar with the vessel or its implements or tools; no drill or station practice or helpful discipline disturbed the tranquility of that voyage, and when the crisis came a state of absolute unpreparedness stupefied both passengers and crew, and in their despair the ship went down, carrying as needless a sacrifice of noble women and brave men as ever clustered about the Judgment Seat in any single moment of passing time.

"Some things are dearer than life itself, and the refusal of Phillips and Bride, wireless operators, to desert their posts of duty, even after the water had mounted to the upper deck, because the captain had not given them permission to leave, is an example of faithfulness worthy of the highest praise."

continued on page 18



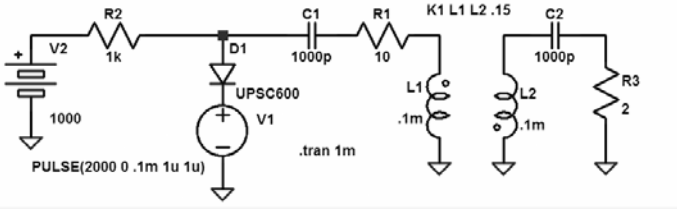


Figure 4a.

Contests

Contest Manager: Frank Hunt ZL2BR
<zl2br@ihug.co.nz>

The NZART Memorial Contest.

Has this contest passed 'its use by date'? Is it still relevant in 2012? Can it be re-vamped or should it be replaced with a more attractive format contest open to both ZL and VK stations?

What about a 160m/40m/80m contest running on one day only Saturday or Sunday, say from 1500 to 2100 NZST, with two three-hour operating periods?

Instead of the ZL1/2/3/4 prefixes being the scoring multipliers, why not use, year first licenced, (as in the SCC contest), or age, (as in the All-Asian and JARTS contests)? Or something else?

Anyone who has some thoughts or ideas on this matter, please email me at <2bfrank@orcon.net.nz>

At present there are seven operating sections in the Memorial Contest, each with its own trophy, cup or plaque for the section winner. However over recent years some operating sections have had no entrants or maybe just one entrant. The various trophies used to be sent to section winners, but it would seem that in general this practise ceased in the mid-1980's and the trophies have remained in the NZART office HQ since then.

Anyway, this year the 67th ZL Memorial Contest will go ahead as usual:

When: 7 & 8 July 2012

Times: 2000 – 2300 NZST both evenings

Band: 80 m

Modes: CW & Phone

Rules: The rules are the same as recent years and are in the NZART *Call Book* on page 5-5 and also at <www.nzart.org.nz/contests>

Logs: Logs as email attachments are welcome in either Cabrillo log text, plain text, Word or Excel format. Email them to <2bfrank@orcon.net.nz> *. Paper logs should be posted to Contest Manager, 8 Manu Cres New Plymouth 4310. Closing date for logs will be 31st August 2012.

* Please note that this year, acknowledgements of email logs will not sent out until the end of August, as I will be overseas from July 11 to around August 25. (Please keep an ear out for VY1/ZL2BR and KL7/ZL2BR)

International HF Contest Calendar for July/August 2012

Contest	Dates	Times (UTC)	Website
DL DX RTTY	Jul 7/8	1100 Sat–1100 Sun	<www.drcg.de/.>
IARU HF CW/SSB	Jul 14/15	1200 Sat–1200 Sun	<www.iaru.org/contest.htm>
RSGB IOTA CW/SSB	Jul 28/29	1200 Sat–1200 Sun	<www.rsgbcc.org/hf/rules/2012/riota.shtm>
WAE (Worked All Europe) CW	Aug 11/12	0000 Sat–2400 Sun	<www.darc.de/referate/dx/contest/waedc/en/rules>
SARTG (Scandinavian) RTTY	Aug 18/19	0000–0800 Sat, 1600–2400 Sat & 0800–1600 Sun	<www.sartg.com/contest/wwrules.ht>

◂ *continued from page 17*

Without the wireless messages, nobody would have known the Titanic's position when she sank. Would the lifeboats, containing the 706 survivors, have been found before they, too, died from hypothermia?

Last month's problem

Firstly, my apologies to Ross ZL3TFK for omitting his name from the list of those who solved the problem before last. Ross was also the first to give the correct answer to last month's problem, in less than a day. Correct answers to at least the first part also came from Ron ZL1AI, Alastair ZL2ARC, Stuart ZL2AAC, and Doug ZL2TAR.

See figure 4(a), the Lonsdale network. Remove all the horizontal resistors. Connect a battery of voltage *V* between terminals *A* and *B*. The voltages at the upper and lower junctions of the vertical resistor chains will all be *2V/3* and *V/3* volt respectively. Thus no current could flow in the resistor connected between corresponding junctions, so the horizontal resistors have no effect! We are left with resistors of 3Ω, 6Ω,12Ω and 24Ω in parallel, which combine to give 1.6Ω.

The second part of the problem assumes that the network is continued indefinitely to the right, with sequential resistor values increasing following the same algorithm. The total admittance is a sum to infinity of the individual admittances, a series which is a geometric progression. Evaluating this, the total resistance is found to be 1.5Ω.

Ron ZL1AI, however, arrived at this solution purely by logical deduction:

"Looking now at the infinite network, it is obvious by inspection that as each rung is added to the ladder, the conductance is increased by half the amount needed to reach 2/3 mho. In the infinite case, therefore, G = 2/3 mho, R = 1.5Ω".

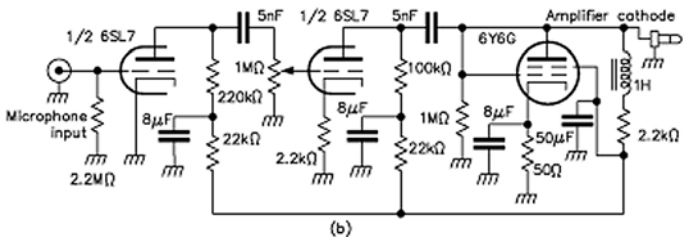


Figure 4b. Left: Last month's problem. Right: This month's problem.

This month's problem

Last month I write about the "powerless modulator" I once built, and gave the circuit. Tony ZL2ATZ wrote:

"As an impecunious schoolboy who could not afford a modulation transformer, I used exactly that cathode modulator with a single 807, very successfully! Later I discovered a centre-tapped-secondary mains power transformer could be used back-to-front with push-pull 6L6s modulating the 807. And the 6L6s could be cunningly push-pull driven from the anode and cathode of the previous stage, thus eliminating the need for a coupling transformer, which would have required six months pocket-money!

"Another thing I remembered was using the field coil of a loudspeaker for the filter choke, doubtless recycled from a pre-WWII radiogram, when they very often used an electromagnet in the speaker, which not only enabled the voice coil to work, but was used to smooth the B+ line. I was very lucky to have souvenired that particular item, because it was usually the field coil that burned out."

Figure 4(b) shows the schematic again. Looking at this in print after my *Break-In* arrived, I immediately saw that it contained one glaring error! This month's problem is to tell me what it is. Funny how you only see these things when it's too late to do anything about them.

References

[1] Technical details: <http://marconigraph.com/titanic/tech/mgy_tech.html>
[2] Paul Lee's analysis. <http://<www.paullee.com/titanic/pv.html>
[3] <http://<www.fistsdownunder.org/-%20Additions/discovery_20120409-2006a%20Titanic.mp3 >
[4] The Titanic Radio Page <http://<www.hf.ro/>
[5] Bruce Beverage's details <http://<www.encyclopedia-titanica.org/discus/messages/5919/206900.html>
[6] Deleted radio room scene from "Titanic". <http://<www.youtube.com/watch?v=U8PLDqqdpu0>
[7] Synchronous spark transmitter demo <http://<www.historum.com/general-history/6392-mgy-cqd-sos-titanic-cqd-sos-titanics-wireless-odyssey.html>
[8] Magnetic detector <http://en.wikipedia.org/wiki/Magnetic_detector>
[9] Titanic Inquiry Project <http://<www.titanicinquiry.org/>

Monitoring Service

Monitoring Service Co-ordinator: John Martin ZL1GWE
<john.martin@nz1.ibm.com>

Greetings to all, including Short Wave Listeners and contributors. The last couple of months have been quite interesting for several reasons:

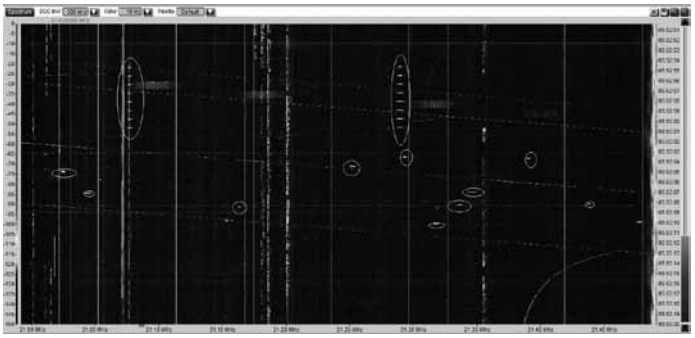
1 After intensively monitoring the HF bands, it has been ascertained that there is a prolific intruder, which is rarely discussed or reported upon. The intruder is what is termed "HF Man Packs", Military standard equipment, which is widely sold within the Region 3 zone. It consists of 6-8 pulses, on the same frequency, within the space of 6 seconds, before disappearing and appearing on another frequency, sometimes over 2 MHz or further. This behaviour indicates they have frequency hopping abilities. The past few months indicates they in fact more prolific than OTHR (radar) or CODAR (oceanographic systems), as they appear to have no respect for ITU spectrum allocations, whatsoever. It is assumed, many people may intermittently come across them, but believe they may be noise from "Venus" or similar and forget to report them or ignore them completely. In my experience, once one's ears are attuned to the HF Man Packs, it is similar to a "duck shooting" season on the HF bands. Which is almost, compulsive as attempting to communicate with rare DX expeditions or chasing awards to DXers?

The HF Man Pack transceivers use transmission pulses, which consist of 6 or 8 Phase Shift Keying pulses, all of which establish a Start of Message (SOM), with other stations within the group, who respond, and establish a Start of Conversation (SOC), maintaining communications between each other. It is understood that these transmissions are entirely encrypted and also use Electronic Counter Communications Measures (ECCM), which are used by military equipment. The power of these portable systems varies from 20 W to 150 W, but they propagate extremely well, and are obviously regularly deployed. See the diagram below for further details: The screenshot shows a wideband spectrum of 1.5 MHz across the 15 m band. Examples include[1] and [2], there are many more.

Note the ringed 8 pulses; this is the start of the communication process, which results in smaller PSK pulses being exchanged between stations. The quickest, way to report them is to record the frequency, date/time and emission, which according to the ITU Emissions designations is G7DF.

2 There has been a marked drop off, of casual and active reporters during the last two months. I put this down to the Indian summer, we have been experiencing, but there must be some people, SWLers, Radio Amateurs or Radio Amateur clubs with a competitive streak in them? Hence, the reason we established the NZART Top Intruder System Observer League Table, to encourage others to participate, casually or actively in reporting intruders, with a nice reward for the most prolific contributor, barring ex and current Monitoring System Coordinators. NZART is offering, for the winning contributor, a free membership to the NZART for the year. As many long time SWLers will tell you, they enjoy the discovery of new and regular stations, whether they are intruder or totally legitimate.

It has been an interesting observation that the ITU monitoring reports do not mention the characteristics of Over the Horizon Radar (OTHR) systems, but do concentrate on the direction of the source. This indicates, that direction and Radio Direction Finding is very important to professional monitoring services and perhaps, this is something that needs to be addressed by Monitoring System Coordinators and associations; the ability to collaborate amongst ourselves with reliable direction finding capabilities for the purpose of raising complaints, which will be taken heed of i.e. action taken to remove intruders into the Amateur Radio allocated spectrums.[3] Whereas the actual characteristics of the radar system, Pulse Repetition Frequency (PRF) or Pulses per Second (PPS) is not necessarily that important.



Intruder System Observer League Table 2012 (up to end of April 2012)	
Contributor name/Call-sign	**Number of verified reports**
John ZL1GWE	352
Bob ZL1BAD	139
Brett ex VR2BG/P	13
Stephen ZL1TPH	10
Phillip ZL2TZE	7
David ZL1DGK	3
Rex ZL4IV	2
Gary ZL2iFB	1
Dallas NZRDXL	1
Bill ZL3NB	1
Others	0

Table 1

Frequency	identifier	Comments, 40 metres
7000*	OTHR	PXX – Suspected source: Chinese Over The Horizon Radar (Spreading out of band) > or < 43 Pulses per Second (sounds like a badly tuned tractor)
7000	NON	Suspected Inter Modulation Distortion (IMD) or Broadcast Station carrier.
7000	CODAR	VXX – Coastal Ocean Dynamics Applications Radar – suspected source: Chinese > or < 2 Pulses per Second (swish, swish type sound)
7039	C	A1A Russian beacon Moscow; Old call sign RIW
7039	A	A1A Russian beacon Astrakhan no call sign
7039	P	A1A Russian beacon Kalingrad Old call sign RMP
7039	F	A1A Russian beacon Vladivistok Old call sign RJS
7039.3	K	A1A- Russian beacon Petropavlova Old call sign RCC
7039.4	M	A1A Russian beacon Magadan Old call sign RTS
7039.9	S	A1A Russian beacon Severomorsk Old call sign RIT
7054	No Call	F1B Russian Air Force REA4 RTTY 200 Hz shift and encrypted

For those who want to participate in the NZART Top Intruder System Observer Award for 2012, Table 1 shows some easy places to pick up intruders on 40 metres:

Some additional pointers will be provided in next edition. Please report intruders to: <MS@NZART.org.nz> or <MS2@NZART.org.nz> or <IntruderWatch@GoogleGroups.com> or to your favourite DX Cluster.

If you have any questions, do not hesitate to contact me directly.

John (ZL1GWE)

References

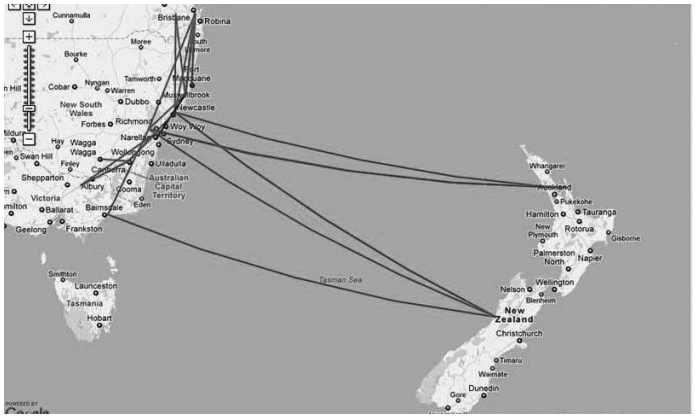
[1] <http://www.railce.com/cw/casc/racal/panther-h.htm>
[2] <http://hf-military-tactical-radio.at-communication.com/en/codan/hf_ssb_transceiver_2110m.html>
[3] <http://www.itu.int/ITU-R/terrestrial/docs/monitoring/files/pdffiles/333.pdf>

VHF Scene

Simon Watt-Wyness ZL1SWW
<zl1sww@nzart.org.nz>

VHF Scene Edition 24

Welcome back for another issue of VHF scene; now is the time that things start to get a bit quieter on the DX regarding Tropo / Sporadic E and the fewer openings experienced. It's time to start thinking about new projects or upgrades to existing systems as well as enjoying some quality shack time where possible. Personally I have not had too much time to do much hamming due to the never ending work commitments with quite a lot of travel away from home.



Late ZL to VK 2 m Tropo opening.

6m Happenings

There appears to have been a bit of activity with spots from overseas stations hearing the ZL TV carriers from Philippines, Japan and Australia to name a few.

Bob ZL1RS seems to have been consistently working into Japan along with Rod ZL3NW, Bob ZL3TY, ZL3IO and others.

ROD ZL3NW reports "On the 7 of April conditions for EME were quite good and this was confirmed by contacts with Jeff K7XQ and Hal N7NW. On the 14 of April I was on the edge of an opening between JA and ZL, I had just the one contact with JA6WIF but I could hear the JA pile up working 9M0L. Unfortunately no sign of 9M0L here. On the 17 I had a contact with Warwick E51WL with minimal 419 signals. On the 21 I had another one of the many EME contacts with Ian G5WQ. What was perhaps interesting was the degradation was high at -5 and during the window the moon passed in front of the sun. Despite all this signals from Ian peaked at -18 dB and it was a very easy EME contact."

Bob ZL3TY mentions "Six metres has been disappointing here, usually the equinox period, particularly around 1 April will bring some long distance DX, but this year solar activity stayed low and I heard and worked nothing until later in the month. First opening was 14 April, to BA4SI. On 15 April I worked BA4SI and four JAs. On 27 April a good opening brought BG4SOC, BG6CJR, BA4SI, DS2CYI and four JAs."

2m and above activity

There has been a bit of activity from the usual operators, both internal and over to VK on Meteor Scatter (MS) using FSK441.

The low band contest was on in early April with some activity from a number of stations. QSO count was not high but nonetheless some fun was had. On one occasion Steve ZL1TPH and the scribe heard clearly the full ZL4AA call via a meteor burn to us in Auckland and further north. ZL4AA was operating at Swampy summit near Dunedin. Soon as we heard the ZL4AA, Steve jumped on at the end of the burn with his call of which ZL4AA heard Steve's call with the 'Dah Di Dah' tone. Simon ZL2FAE was operating from Paekakariki with good signals into Auckland with 50 W. Many contacts were had with him.

Despite being relatively quiet on the "across the pond" DX, a late in the season 144 MHz Tropo event occurred on the 14 April 2012, with Bob ZL3TY in the South island working across to VK3DUT, ZL2BCC and VK2ZT, and in the North Island Steve ZL1TPH/p across to VK2BCC and VK2ZT, with path distances from 2010 to 2237 km.

Bob ZL3TY comments on his recent activity having mentioned a bit of a slow start but recently 2 m and 6 m have shown a bit of life.

"70 cm: On 25 March I worked OK1DFC, Zdenek, on 70 cm EME. The unusual feature of the QSO was my station running a single 22 element Yagi and TS790 with 30 W out and no preamp. OK1DFC has a big station with 10 m dish and QRO. We used JT65B digital mode which is remarkable for its ability to detect signals you can't hear. This was my second 70 cm EME QSO, the first was with DL7APV in 2009.

2 m: The weekly meteor scatter sessions with VK stations on Saturday mornings continue with usually three or four QSOs each time. Stations active in VK include VK7MO, VK3GHZ, VK1WJ, VK-2DVZ, and VK2AMS. During the activities on Saturday 14 April I noticed that the Channel 5A video carrier was present, although there was no Tropo enhancement on any of the meteor scatter signals. After the MS was over I went down the band and worked VK2ZT, VK2BCC and VK3DUT on 144.1 MHz. The band was open for several hours, a surprise bonus having a tropo opening so late in the season.

The only EME activity on 2 m was on 28 April, EY8ZF, PA2CHR and YL2GD."

Constructional

Simon ZL2BRG has just completed a new DB6NT / Kuhne 10 GHz transverter and a 2 W PA feeding a 65 cm offset dish. He is keen for some contacts.

Peter ZL4LV is involved in a project with David ZL4DK and Hugh ZL4HL where a pair of 23 cm amplifiers are under construction for David and Hugh. The work is a team effort between the three of them. The picture below shows the progress with one of the amplifiers showing its valve anode protruding. This has yet to have its water jacket made for the water cooling.

They are based on a design from KD5FZX using Russian GS15B tetrodes. They are operated with the screen earthed and the anode to screen voltage of 1600 V, the valve cathode is at minus 400 V giving at total operating voltage of 2000 V. These amplifiers should be capable of 300 to 400 W output.

Amateur Radio Direction Finding (ARDF) Activity from Auckland

Wallace ZL1WAL on behalf of Auckland Branch 02, was instrumental in having another Fox hunt in Dingle Dell. This event was devised with the aim of stimulating inter-branch competition. There were about 10 or so operators from different branches with differing styles of equipment and methods. There were five foxes running on 144.7 MHz located at various points in the park. It was interesting to experience the numbers of multipath and general reflections sometimes playing havoc with the DF gear.

Later on, a few of us did a hunt for

23cm amplifier April 2012.

ARDF social gathering; just after the event. Auckland Branch 02.

an 80 m fox. This was interesting in itself noting the differing technique and the type of direction finding gear. The integrated ferrite bar antenna worked a treat. No problems with reflections affecting this one!

A fun day was had by all and good to see and meet some new faces there. A barbeque was held beforehand. All in all, a well organized day with lots of fun. Vaughan ZL1TGC took the honours of coming first with Simon ZL1SWW second and Harry ZL1BK third. Thanks go to the Branch 02 members who made this happen notably Wallace ZL1WAL for the venue, Gwynne ZL1AAR for the great barbeque skills and Ray ZL1AJR recording the starts and finishes.

The scribe had hurriedly built up a TDOA (Time Difference of Arrival) DF unit especially for the event. It proved quite successful and the design has been used by many throughout the world. For more info, refer to <http://theleggios.net/wb2hol/projects/rdf/tdoa1.htm>. The scribe's unit uses this basic principle but used CMOS inverters for the oscillator instead of the 555 timer IC.

Interestingly enough, Harry ZL1BK and the scribe did a practice run to check operation by listening to a 14 MHz oscillator crystal pack from an old computer that generated nice harmonics easily heard on 144 MHz. It was hung in a bush along with its dipole antenna. Tests were done with Harry's and mine to see how they worked and the differences were noted. The two devices were essentially the same design but it was noted that Harry's pointed more accurately, the difference possibly being the boom material used; Harry's was fibreglass and the scribe's was from aluminium. Harry's antenna was mounted onto the scribe's electronics and the directivity improved. The aluminium boom may cause a slight loss of directivity. Has anyone else who has built this unit experienced this phenomenon?

Care must be taken that coax feed points to each dipole are the same length to avoid a squint effect when dong the DF.

Low Band VHF Contest Results

The overall winner was ZL4AA, in second place ZL2FAE, and in third place ZL3ED. ZL4AA had the highest score on each band. The best DX was 643 km on 2 m, between ZL2FAE and ZL4AA.

2012 VHF-UHF-SHF Contest Calendar

Hibernation Contest. All bands 50 MHz and up. Normally the first Saturday in June, and the following day. This will be delayed one week as it clashes with NZART Conference and will be on the 9 and 10 June.

Brass Monkey Contest. All bands 50 MHz and up. On Saturday the 4th and Sunday the 5 of August 2012.

Microwave Contest. All bands 614 MHz and up. (6 and 7 October)

Field Day Contest. All bands 50 MHz and up. (1 and 2 December)

For all contests, the operating periods are 1700 to 2300 on the Saturday, and 0700 to 1300 on the Sunday, NZ local time. The Contest Rules are available at: <www.vhf.org.nz/VHF-UHF-SHF-ContestRules> . All contest logs should be sent, to arrive within two weeks, to: < zl2wa@clear.net.nz>

New Members

Name	*City/Town*	*Branch*	*Call-sign*
I G Honey	Cambridge	4	ZL1IAN
PJ MacArthur	Dunedin	30	ZL4TLA
D S Bryant	Rotorua	33	ZL1DSB
B Fields	Waikouiti	30	ZL3XDJ
David Phillips	Upper Hutt	63	ZL2DBP
Q Pooke	Chrsitchurch	56	ZL3YOK
C Buckley	Whangarei	28	ZL1CLE
N McFadyen	Tauranga	33	ZL1TOI
W Stringer	Christchurch	5	ZL3WLS
K Callahan	Wairoa	11	ZL2KCW
G Viana	Auckland	2	ZL1BRA
R Eyre	Whangarei	28	ZL1MAD
K Coppieters	Porirua	18	ZL2KRIS
Oliver Ewert	Upper Hutt	74	ZL2OLY
Stephen Mercer	Plimmerton	74	ZL2SFM
Ivan Nelson	Helensville	29	ZL1OTF
H J Scott	Nelson	26	ZL2TYF
D Mason	Auckland	2	ZL1AZK
R Moody	Waiuku	65	ZL1FLY
A D Stroobant	Auckland	2	ZL2ATZ
A Hodge	Papakura	65	ZL3ALX
D Buckley	Whangarei	28	ZL1EQS
W Wallace	Nelson	26	ZL4WD
Steve Rowe	Auckland	65	ZL1DAR
M Power	Papakura	65	ZL1MJP
ME O'Malley	Christchurch	5	ZL3YL
R Lammas	Nelson	26	ZL1RJL
M Goodger	Nelson	26	ZL4MAT
N J McDonald	Paraparaumu	69	
C M Hollis	Auckland	65	ZL1CMH
G Small	Christchurch	5	ZL3FS
S Salthouse	Auckland	29	ZL1MHZ
S Williamson	Hikurangi	28	ZL1SAR
O Eugster	Whangarei	28	ZL1EWT
P Garden	Tairua	41	ZL1TOK
R Barlow	Hastings	13	ZL2RB
I Lee	Auckland	29	ZL1IL
C F Veitch	Hastings	13	ZL2VF
J Paynter	Hastings	13	ZL2ON
R J Senior	Wairoa	25	ZL2UDE
D Sewpershad	Papakura	65	ZL1DEN
C Van der Merwe	Te Awamutu	12	ZL1CVM
AN Van der Merwe	Te Awamutu	12	ZL1ANV
W Goossens	Te Aro Wgtn	50	ZL2WEG
R J Hopkins	Tauranga	39	ZL1RJH
J Stephens	Tauranga	39	ZL2DD
C J Hellyar	Leeston	56	ZL3LF

Summary

Many thanks go to the contributors who help make this column happen with their input – ZL1TPH, ZL2BRG, ZL3TY, ZL3NW, ZL4LV, ZL4DK and others. If you have input and pictures for the columns ahead; such as DX activity reports, repeater installation, branch activities, snippets of interest, technical items etc, please send to Simon ZL1SWW <zl1sww@nzart.org.nz> or *Call Book* addresses. (I also accept large picture files sent via email).

Digital Modes

Murray Greenman ZL1BPU
<zl1bpu@nzart.org.nz>

What is a QSO?

The other day I came across an interesting paper by Klaus DJ5HG[1]. He discusses the basics of radio communication, the transfer of information, the detection of signals, and the dialog that takes place via the radio path. He is especially interested in minimal exchange weak-signal communication, the mechanism of information exchange during a QSO, and just what a QSO consists of.

He makes an interesting point about QSOs; much of what a QSO should consist of may frequently be assumed without being actually received; for example, did you really copy the call-sign, or just infer it from sked time, context or frequency, and did the other station repeat back your call-sign correctly, or did you just think he did? Further, did he confirm that you have his call correct? Was there really a QSO at all? How many of your DX claims are based on such thin evidence, eh?

Klaus disapproves of what we might call 'internet assisted' QSOs, as in this way much of what should define the QSO can be confirmed by a more trivial path. I encourage you to read Klaus' paper thoughtfully, as he makes some useful points.

New Mode; HDCW

New modes are few and far between these days. This one won't get many of you all excited, but it is interesting nevertheless. The mode is designed for VHF weak-signal use, and has a reasonably wide bandwidth in order to combat auroral spreading[2].

Unlike some modes released in recent times, HDCW is accompanied by full technical disclosure and documentation in the approved manner. Modulation is ASK or FSK, and uses a restricted character set in order to maximise the information per bit and the data rate. The typical typing speed is 87 characters per minute, or about 15 wpm.

Unlike Morse, each character is the same length, and has many bits, 0 or 1. Each character is coded as 43 serial data bits, the bit patterns chosen to give maximum difference between patterns (maximum Hamming Distance), in order to give maximum decoding reliability. Although there are 903 possible arrangements of 43 bits, only a small number of the patterns are used, allowing the receiving decoder to measure the 'distance' (confidence) between the received code and the nearest correct character, in order to best determine what was sent.

This is very similar to the Walsh-Hadamard approach first used by amateurs in the MT63 mode, and more recently in the ponderous Olivia modes and probably in Opera. All the correct HDCW codes are different by 22 bits from each other, and by design the receiver can interpret all characters with full confidence, even with up to 10 bits incorrect!

What interests me most about this new mode is the way that the receiver produces a 'soft' display. While not a truly 'fuzzy' mode (where the received data is analog and no interpretation is made by the computer of what is received, or when it is received), the printed presentation of each of the characters received has a strength (brightness) property that reflects the confidence with which the character is decoded. Thus, if a message is received with some very faint letters, you are free to interpret, by ignoring the faint letters or mentally substituting what might have been the correct ones sent. I recommend reading the user manual out of interest, whether you plan to operate the new mode or not.

One unusual aspect of the software for this new mode is that it is written in MATLAB (a maths processing system rather than a compiler for a conventional computer language). The download comes with a special run-time version of MATLAB matched to the software. The clever receiving software is also able to decode several signals at once within the 2.4 kHz receiver bandwidth.

Kite antennas

Like many radio amateurs, I have several other hobbies, and one of them is making and flying kites. I specialize in the type that require very little wind, and frequently amaze people by flying them at a good height when at ground level there is no apparent wind at all. I like to fly many from one line, and have achieved 10 at once on 300m of line.

Wouldn't it be great to use the kite line for an antenna? While not an entirely new idea (it was patented 150 years ago, and used by the SCR-578 'Gibson Girl' and several similar war-time emergency transmitters[3]), not many amateurs have attempted it, as it is logistically difficult and can be dangerous (due to charge build-up on the antenna caused by friction effects), unless the antenna always has a DC path to ground.

Maximum benefit would be obtained for portable operation on the lower bands where it is difficult otherwise to achieve antennas of reasonable size compared with the wavelength. The only examples I've heard of recently have been on LF and VLF. I understand you need a team of at least three people; one to operate the kite, one to operate the rig, and a third to manage the antenna and operate the antenna tuner, as of course the tuning changes all the time as the kite moves about. Peter G3PLX developed an interesting arrangement (Figure 1A) whereby the kite flies on a leading line equipped with a pulley at the lower end, through which the antenna is raised. The remote end of the antenna has an insulated wire returning to earth, so the kite holds the antenna in a triangle shape, and travels a little along the line as the wind changes, and in this way reduces the effect wind changes have on the antenna height.

I am fortunate in having in my collection of junk the original kite line/antenna from a Gibson Girl (braided nylon with a sheath of braided copper, like thin coax), which I mean to try some time. For MF and HF use, a conventional kite on a conventional nylon line could be used to lift a vertical antenna consisting of thin transformer wire (i.e. with the base and tuner directly below the kite). See Figure 1B. With this arrangement you need to have some means of taking in the slack on the vertical antenna wire. A 'Slinky' antenna section (like a spring) would be ideal here!

The Gibson Girl kite was a box kite, strongly built of canvas and dowels, best in high winds and heavy to fly. For amateur purposes, a large delta, or train of deltas, would be best. They fly in light winds, fly high and are very stable. You can buy big delta kites from fishing shops, or as I do, make your own easily enough. I cut my own sticks from pine and use rip-stop nylon offcuts from a sail maker, sewn together with a conventional sewing machine. I make fixed joints with sections of TV antenna tubing, and the hinged joints from the sheath of recycled RG11 coax!

Bear in mind that the maximum height permitted for kites without a permit is 60m, and they must not be flown near airfields. To my mind 60m is ridiculously restrictive, as with a good high-flying kite on a light line you can reach this height with less than 100m of line, the length of a football field, and stable wind is often not reached until at least 50m up.

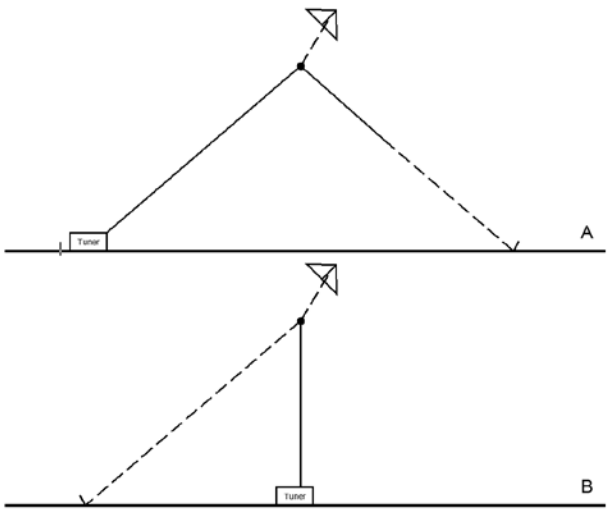


Figure 1. Kites as Antennas.

Dodgy Downloads

Now for something completely different! I have been asked now and then over recent years, and again this week by Tony ZL2ATZ, how to find software on the Internet, without risking downloading a virus or having your details stolen for a subsequent deluge of junk email.

The particular problem is that many of the sites you discover when making a search on the Internet are parasites, wanting to sell you something, steal your identity and contact information, advertise something, or to send you some dangerous code. They do this by using something you are particularly looking for to lure you in. They may take your request and make up a convincing reply on the fly, based on mostly spurious stuff gleaned automatically from the web. Many of these sites are in breach of the wanted information owner's copyright, and even if they eventually deliver, may well in the meantime have sent you so much dodgy stuff you won't know where you are!

The answer is to use the search tools very selectively. Do not just take the most plausible link at the top of the list; look carefully at the URL for each link, and check if it is from a reputable source. It may be the developer's own web page, or a legitimate independent host (for example, I host all ZL2AFP's software[4]) Many software developers use a common software repository, a central location where all their software is hosted, and a blog or web page is provided there in order to announce and manage upgrades. Perhaps the best example is SourceForge[5], although there are many others, including repositories for Linux and Android platforms.

Unfortunately some developers (I can think of one in particular) are ill-advised, and host their software on sites which throw advertising at you willy-nilly, and bury the downloads in a mire of unwanted trash. (Reference [6] is an example). I recommend avoiding such developers. Where you can, stick to respected developers and trusted software. Ask your most computer-savvy friends for advice, or email me. You can generally trust links I give you here.

The best test of whether you have the correct source for the program you want is whether the link refers directly to the developer and any other software of theirs. The download link should refer to an executable (.exe) or archive (.zip, .rar, .tar etc), not another web page. If the references are vague, or the page is full of unwanted advertisements, flashing lights, with the download link hidden in a corner, the last to load, or the download button points to somewhere suspicious, back out pronto! Something offered '!!! FREE !!!' is likely to be something easily caught and difficult to get rid of.

Oh, and always virus check downloads before you install them, and again afterwards. Don't trust any 'virus free' assertions. To be really sure, employ a 'king's taster', a spare sacrificial computer to first install on where a virus infection will be easily spotted and do little damage.

Figure 2. The PDP11/04 computer; hardly small!

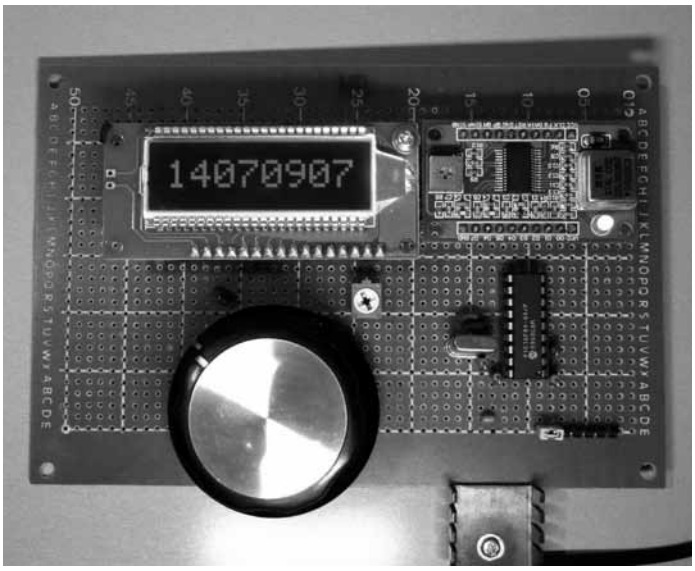


Figure 3. ZL1WJQ's DDS controller.

Super Computer

Well, super large is what I mean! Andrew ZL1WJQ told me recently that he has acquired a vintage PDP11/04 computer (Figure 2). It consists of two 6 ft racks, and has three large disc (10 inch?) drives. This computer is modern enough to have 64k of RAM memory!

In the photo, the big box to the left is power supply, and the computer on the right. You can see the three disc drives occupy all the top of the rack, the lowest one with a cartridge in place. The middle one has a fixed disc. The main processor is below with the sloping front. I guess this computer dates from about 1975. Many years ago I owned a PDP11/40, even older, with 32k of core memory (tiny ferrite beads, one per data bit). It had only punched tape input and a golf-ball typewriter for output. I wonder what happened to it?

The oldest computer I own now is a 1988 Toshiba T5200/100 'luggable', a portable computer with a red plasma screen. It has a 100 MB hard disc, 2 MB RAM, and an 80386 MHz processor with 20 MHz performance. In full working order, I used it recently to program a VHF handheld radio, since the software would not work correctly on newer computers.

The phone in my pocket has more power, more memory, and more connectivity than these old computers, and cost a fraction of the price. So there is progress in the digital world!

DDS Synthesizers

In the last column I alerted you to a cheap Direct Digital Synthesis module, which would provide output to 30 MHz or so, ideal as a VFO for your QRP rig, a signal generator or a MEPT controller. It is very similar to the one offered by the NJQRP [7]. To use this module you need a control micro. Several are offered on the NJQRP site [8]. Andrew ZL1WJQ was quick off the mark, and already has one of these units going (Figure 3). The design Andrew has used is by N2APB [9].

In Andrew's photo, the DDS module is top right, next to the LCD display. The PIC micro is below the DDS module. Behind the big knob is a rotary encoder, used for tuning. The unit is assembled on 'spot' board, like Veroboard, but with copper dots instead of stripes. This type of board lends itself better to tidy layout by simply joining the dots.

Andrew adapted the code slightly to change the display appearance to suit a single-line display, and is using the unit as a VFO for an SSB transceiver.

References

[1]<http://www.dj5hg.de/CatSquirrel.pdf>
[2]www.dj5hg.de/dj5hg_download.html>
[3]<http://www.thekitesociety.org.uk/PDF/Gibson%20Girl.PDF>
[4]<http://www.qsl.net/zl1bpu/SOFT/Index.htm>
[5]<http://sourceforge.net/>
[6]<http://rosmodem.wordpress.com/>
[7]<http://www.njqrp.org/dds/>
[8]<http://www.njqrp.org/ham-pic/projects.htm>
[9]<http://www.qsl.net/yo5ofh/projects/dds_vfo_by_n2apb/circuit.jpg>

Contributions to Break-In

Break-In is a forum for NZART member's amateur radio projects, experiences, opinions and news. Your contributions and feedback is welcomed. Contact the Editor John Walker ZL3IB at <john.zl3ib@ihug.co.nz>

SPAM – Society For The Preservation Of Amplitude Modulation

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3.850 MHz (AM) Friday nights at 2000 hr local time.

Silent Keys

There is one Silent Key to report this month.

- #23, ZL2ACE, Rod Greene, Wanganui

Our sympathy is extended to Jenny.

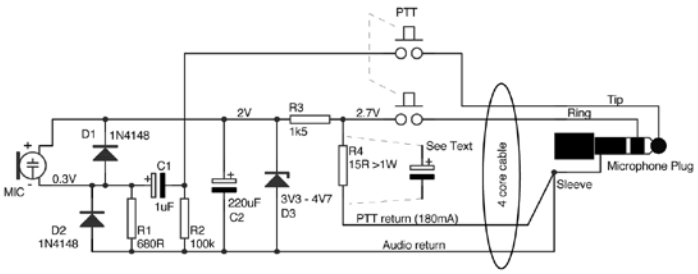
An electret microphone for a ZC1

By Gary Henderson ZL2TBH

Late last year I acquired (rescued?) a ZC1 Mk2. This was fairly complete but lacked the required "Handset No.7" needed to operate AM. A kind local ham gave me one of these handsets and a dynamic insert for it, but the particular combination of handset-body and screw-cap fell by ⅛" short of depth needed to accommodate the said insert. Measurements established that the ZC1 (with the "standard" AREC modifications to the modulation chain) needed almost 8 mV of audio to achieve its maximum modulation; which is quite a bit more than even very good dynamic microphones (such as Audio-Tecnica AT-818, a competitor to the famous Shure SM58) could achieve; also more than the ZC1-type insert I had would put out, in absence of the rubber horn that they originally used. Knowing that the PTT circuit provides a source of 12V DC at about 60 ohms, I decided that I'd try an electret capsule; these are tiny so there would be plenty of room for an amplifier if needed. They are also very sensitive, because the mass of the diaphragm is extremely small and the in-built FET provides power gain.

My scheme to power the electret capsule had to allow for the need to keep voltage drop low (so relays inside the ZC1 would still work reliably) and make allowance for the known ripple from the vibrator power-supply affecting the 12V supply. Particular care was needed to ensure that the filtered 'clean' supply for the capsule had its bypass-capacitors returned to audio ground; not to the PTT return. I also elected to make use of the relatively-high output-impedance of the capsule's internal FET by interchanging the load and supply, i.e. the capsule is connected to the filtered +Vdd with the drain-load resistor going to ground. Note that this does not make the circuit into a source-follower because the actual electret device remains connected directly between source and gate of the built-in FET. Any residual ripple on the filtered +Vdd is divided by a factor of about 10 by this ruse.

I had some ex IQL telephone capsules; these are the larger (10 mm diameter) style which have 2-3 dB more output than the 6 mm types. Surprisingly, in the ones I have the blue lead goes to the + terminal of the electret-capsule while the red lead goes to case. (Look hard to see which of the two solder pads on the rear of your electret capsule has tracks linking it to the case! Don't expect other capsules to necessarily use this same odd arrangement).



I retained the foam-rubber microphone-holder of the original telephone handset; this spaces the capsule about 0.5 mm back from the inside of the housing; the telephone's housing has a hole about 4 mm diameter to admit speech. Exposing the entire front of the capsule gives excess sibilance; putting it behind the hole gives pleasant voice quality. I glued the capsule and its holder into a larger ring of foam-rubber to make a tight fit in the front-cover of the Handset No.7. I then found a large grommet (ex firewall of a Hillman Avenger I think!) which slipped neatly over the projection on the front-cover of the handset, with a 4 mm hole in the centre. Perfect!

A trial with the PTT-powering arrangement connected, prior to building a low-gain preamplifier I had designed, showed that the capsule I was using gave more than 8 mV output on speech, so the preamplifier was not necessary. However, after a few days use the output-level started dropping. I had provided adequate means of preventing overvoltages on the supply side so clearly switching-transients from the ZC1 were getting back into the output of the electret capsule. Addition of the two reverse-biased diodes D1 and D2 limits any such transient voltages to (Vdd + 0.8) V and (0-0.8) V respectively without affecting voice signals. Ideally some series resistance should be provided after C1, but no further problems have occurred.

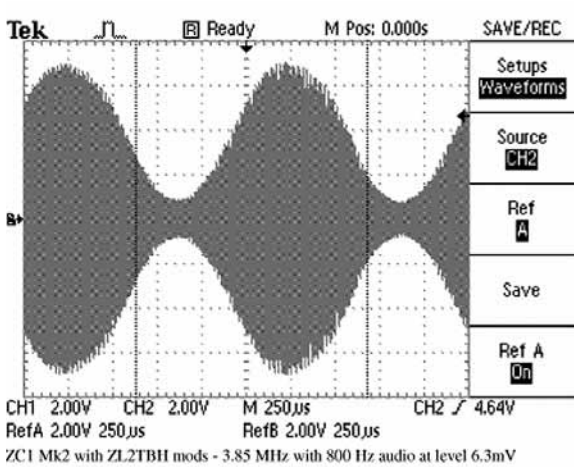
Referring to the complete circuit diagram: note the separation of the microphone earth-return from the PTT return. This is readily achieved even with the original microphone cable, because the required forth conductor is already there! (A bit of work to access its ends though…).

Powering

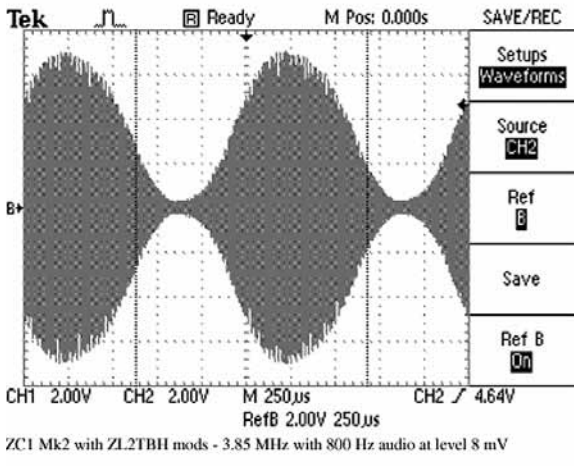
The 15 ohm 1W resistor R4 drops about 2.7V; the relays remain reliable with over 4V drop so this should never give problems. This resistor must return to the PTT-earth lead, not the audio-earth! The 1k5 resistor R3 drops this to about 2V, capacitor C2 (220 µF) filters this; it must return to the audio-earth lead; no use injecting ripple via its negative lead! A small zener-diode D3 is provided to prevent excess voltage reaching the capsule; any value from 3.3V to 4.7V should be OK.

Speech-circuit

Any modern electret microphone-capsule includes a JFET, to which the back-electrode of the capsule is directly connected internally. The load-resistor R1 has about 0.3 V DC developed across it which is enough to allow for over 40 mV pp of audio; this resistor effectively defines the source-impedance of the



ZC1 Mk2 with ZL2TBH mods - 3.85 MHz with 800 Hz audio at level 6.3mV



ZC1 Mk2 with ZL2TBH mods - 3.85 MHz with 800 Hz audio at level 8 mV

microphone. Other capsules may require some fiddling with the value of this resistor; 680 ohms suits the capsules that I have.

Resistor R2 is placed after C1 to minimise transients by defining the DC charge on C1 when the PTT switch is open. And as mentioned above, D1 and D2 prevent transients from inside the ZC1 from driving the output more than 0.8V past Vdd or ground; they have proved to be essential!

Oscilloscope checks show that I can easily drive the ZC1 to maximum modulation without raising my voice, while vibrator-ripple on the signal is kept to a low level. (Just what constitutes "maximum modulation" is the subject of another short article!)

Further suppression of vibrator-ripple (and better relay operation, that had been necessary) could be achieved by adding an electrolytic (say, 220 µF 16V) across R4; if used this one must be directly across R4; i.e. its return should be to the PTT-return lead, not to the audio earth. (It would be bypassing a 'dirty' voltage so would inject an equally-dirty current to earth, so any common-impedance of this current with low-level audio must be avoided.) This capacitor, if fitted, should not affect CW operation as it would be out of circuit while the PTT switch is released. However, from signal reports so far it appears not to be needed.

73 *Gary Henderson ZL2TBH*

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Silent Keys

There are three members to farewell this month. They are:

- #839, ZL2ABZ, John Moore, Wellington
- #849, ZL2ACE, Rod Greene, Wanganui
- #678, ZL2TAK, Cyril Ingham, Lower Hutt

Our sympathy is extended to all their families and friends.

Certificates sent out

Long service certificates have been earned by the following:

60 Year Certificates:

- #571, ZL3QY, Eric Belcher, Greymouth

50 Year Certificates:

- #975, ZL1AXT, Bryce De Luca, Auckland
- #1099, ZL1PP, Peter Dekker, Auckland
- #932, ZL1AXV, Ken Richardson, Papakura
- #791, ZL1AF, Ian Ogier, Palmerston North

Congratulations to all recipients for a long involvement with our hobby.

The Nostalgia of Radio; a purely personal view by ZL2AG Part 2

(continued from March/April issue)

Once a decision was made on which to build, a parts list was made out. This was compared with what was on hand, what could be pressed into service and what could be made to fit. The idea was to reduce the required capital outlay but it usually ensured an unsatisfactory outcome as well. Then, armed with a component list and accumulated pocket money, a parts gathering expedition was mounted. This was best done in the school holidays but there was never enough of them. Parts sources were the Lamphouse with its attendant Bargain Basement, the Electrical Service Company in Farish Street, (always good for anything a bit unusual as long as "Old Mac" could find it), F.J.Fear, E.H.Earl and Wiseman Electric. Fear's was always a last resort as they tended on the expensive side. And so it went on. I would finish up with some parts I needed, some that might do, some that no one had at a price I could afford and with enthusiasm for the project draining away almost as fast as my money. Still, I did complete things, but it usually meant that one project had to be dismantled in order to complete the next one.

Turnbull and Jones was another supplier which was worthy of note. This company, which in the course of my professional career I came to know as Grumble and Groans, was domiciled in Courtenay Place. They had some worthwhile agencies but never seemed to stock anything you actually needed. Unless it was an "Egen®" potentiometer of which they seemed to have untold thousands. They were most unlikely to have anything you wanted at time of asking but would promise you anything by next March. To a schoolboy, obsessed with some project or another, next March might as well have been a thousand years the wrong side of next Christmas! I can recall trying to buy a "Q" (Inductance Specialists) front end for an amateur band receiver and being told they wouldn't have any until next March. I persisted. Next March I presented myself, cash in hand, at the counter only to be told "We haven't got any; they're all gone". Whether they had or whether they just thought a college boy in short pants and with grass stains on his knees was not to be taken seriously I'll never know. T&Js, or at least their counter staff at that time, were a bit like that.

It was while I was going to college

continued on page 26

continued from page 25

that I began to show an interest in ham radio and was introduced to the art in a serious way by Syd Langrope ZL3IA. Syd was one of my mother's generation and ran the fishing boat base station in Akaroa. He in turn put me in touch with Harry McLennan ZL2LW, who lived very close to my home. Harry lived in a little cottage at the bottom of the Ngaio gorge in an area called Kaiwara which was the industrial area which served Wellington City at that time. He had a dipole antenna strung in some willow trees over a creek with a massive hill, on which was the Johnsonville railway line, to his south and the stout brick wall of Levin's wool store to his north. How he ever got a signal out of that place, much less one into it I'll always wonder but he seemed to do well enough. He certainly had regular contacts into Akaroa on 80 metres.

Harry's living room was filled mostly by a large brick fireplace, one of those old smoky arrangements with shelves built up each side of it. What with that, a piano and a table and chairs there wasn't much room to move. His ham rig consisted of an Eddystone receiver, the model of which I now cannot remember but it had octal valves so was probably a 640, and a 150W SSB transmitter which was entirely home brew built into one side of the fireplace. The final of this transmitter was an 813 running grounded grid and occupied a very official looking position at the top of the stack. The chassis consisted of a wooden frame with a heavy copper sheet for the deck all nailed (yes, nailed) together and Harry was immensely proud of it. I, cynic that I was even at that stage, thought this was because he could see to wire it. On his own admission his eyesight was at a stage where wiring an octal socket was about his limit. The other memorable thing about the rig was the power supply, at floor level, home brew and about the size of a small kitchen range. He had constructed the main power transformer in the old traditional way by flattening out sheets of roofing iron and cutting the laminations out with tin snips. Yes, that's the way these old guys did it.

Harry obviously thought that I, as a schoolboy, knew nothing about radio and this produced one of the more memorable incidents of my numerous visits to him. He was explaining to me the virtues of his 813 linear and the differences between grounded grid and the conventional grid driven types. Gain with the grounded grid being not as great but with the input power augmenting the output power, neutralizing and so on. He was using the analogy of horsepower rather than watts and explaining that you needed more horsepower going in to get the same amount out and I was nodding indulgently and beginning to feel a bit sorry for him. Finally I said "What you mean is you have to drive it harder." He stopped, looked a bit startled and then said "Now don't you start getting smart!"

Anyway, things progressed. I built an outboard BFO using a 6C5 and a modified IF transformer for a Philips 596 domestic receiver and wore out the dial cord tuning back and forth over the inch and a half of dial that covered the 80 metre band. Harry gave me a 1947 *ARRL Handbook* and I built a Morse practice oscillator, but for all that I don't seem to have been in any hurry to get on the air. It was 1967 when a group of about 5 of us from the Wellington Central telephone exchange decided to make the effort to get licensed.

Swotting for a ham ticket at that time consisted of studying the questions from 5 or 6 previous exams and devising satisfactory model answers. That and what you had gained from your own natural interest was enough to get you through the technical part of it. At an appointed time we presented ourselves at, if my memory serves me correctly, the Wellington East Post Office to be ushered into a large room filled with school type desks. As I recall there were a significant number of people there. We sat down, were presented with what was supposed to be a 3 hour paper and were given a starting signal. About 30 minutes later I had come to the end of it and wondered why. I went through it again and then looked at the others to find that they had finished too. We shook our heads, shrugged our shoulders, stood up, gave our papers to the supervisor and walked out. As I left I looked back into the room to see a large number of people rubbing their chins, frowning and chewing on their pencils. We finished up in the Masonic Hotel having a session in the bar and trying to figure where we could have gone wrong. How could we finish what was supposed to be a 3 hour paper in 30 minutes? Actually we hadn't gone wrong at all. We had all passed with adequate, if not flying, colours. And that is how, in March 1967, I came to get the call-sign ZL2THQ. This gave me what was known as a Grade III (non-Morse) licence and let me loose on the 2 metre band and anything above that.

From what records I now still hold I was obviously not breaking my neck to get on the air. My principal ham radio interest has always been tinkering rather than operating and I did a lot of tinkering, particularly with experimental receiver techniques. It was not until 1975, after numerous unsatisfactory attempts to build gear of my own, that I laid out on a commercial 2m rig. At that time the two top-of-the-line 2m rigs were the FDK Multi-2000 and the Yaesu FT-211. I chose the FDK because it had the SSB facility which turned out to be somewhat of a waste because we all know how much SSB there is on 2m. I had put a lot of effort into building a two element cubical quad antenna which proved to be remarkably sharp for beam width but seemed not to have a front to back ratio. Not that it mattered because my QTH at that time was such that the signals all came from one direction anyway. I set everything up on channel F, took a deep breath, pressed the switch and called CQ for a signal report to be answered immediately by Jim ZL2BHF. It was 1835 hr on 3 July, 1975 and station ZL2THQ was finally on the air.

It was at this stage that I struck the class distinction that existed between the holders of the three grades of license. It was all to do with Morse speed capability, or the lack of it, and some operators certainly looked upon 'T call' holders as very much lesser beings. One in particular that I knew, now long dead but shall still remain nameless, was downright venomous towards the grade 3 community. As far as he was concerned they were the scum of the earth. If this person was on the judging committee of a competition of any kind there was no point in a T call making any sort of presentation. Regardless of how good he was he wouldn't have had a hope. It must be said that this attitude was not general. It wasn't but it was certainly out there in varying degrees.

In my operating I have always preferred rag chewing to the swapping of signal reports which there seems to be so much of on the VHF bands. In this I found a kindred spirit in the late Ted Gawn ZL2US. He was a retired sea captain and in spite of the difference in our ages we had many common interests and used to have long rag chews on Sunday nights. It was this activity that brought me into contact with the Post Office Radio Inspectors. In the course of a casual conversation with one of my neighbours he asked if I got strong TV interference on Sunday nights. I replied that I did not watch TV on a Sunday night and then thought oops, I'd better have a look at this. I proved that it was my signal, all one watt of it, that was completely wiping his TV picture five houses down the street so I arranged to have the business checked out. A radio inspector arrived, cleared my gear and told the neighbour that if he erected a proper aerial instead of the piece of ribbon which was hanging out the back of his set that would probably fix everything. (It subsequently did.) The inspector then went on at some length about how nice it was to be able to deal with two people who were amicably disposed towards each other. Apparently this is not always the case.

Anyway, when Ted died so did the 2m band for me and I am no longer active there. The HF bands were calling but you needed a Morse pass to get loose on them. Twelve wpm for a so called full call and 5wpm for a Novice ticket which let you into 3.6 to 3.8 MHz. I was schooled to the required 12wpm by a professional telegraphist but it soon became evident that I get some sort of mental block at about 1 minute. At that stage I need to take a deep breath, flex my shoulders and then get back into it for another minute. The test was a three minute one so when I took it the cumulative errors and omissions were such that I failed. I asked the inspector

Letters To The Editor

All Letters to the Editor must be signed and include the author's full name, call-sign, (if applicable) and address. Opinions expressed here are those of the author and do not necessarily reflect official NZART policy.

Letters to the Editor: guidelines to contributors

Letters to the Editor should be concerned with Amateur Radio and normally not exceed 400 words. Break-In *follow the guidelines given on page 4-3 of the 2002-2003* Call-book *"Standards of language, and topics best avoided". Accordingly sex, race, religion and politics are not acceptable subject matter.*

VHF/UHF Records

Sir

In reply to Terry ZL4TAE's letter to the Editor, March/April 2012 *Break-In* page 31 regarding Simon ZL4PLM's proposed rule changes to VHF distance records (Page 30 of the same *Break-In*) it is my opinion that these changes are not acceptable and the existing NZART VHF distance record rules should prevail.

With Simon's proposed rule changes (2012) he has switched from operating modes, to propagation modes as being the primary criteria. To have a set list of defined propagation modes to base each distance record upon, will not be accurate or easily defined over a short period of time. This leads to all sorts of ambiguities foreseeable in the near future, including the transfer of past records to his new format, and is inadvisable.

Mixed mode propagation, along with path extensions are most common, and will be problematic to differentiate between the various propagation modes over the same radio path. You cannot have a set list of propagation modes, when multiple propagation modes exist in the first place. It must be remembered that each distance record listed under a set propagation mode becomes unarguable, so with which propagation mode will you list your next claim with, and how accurate will it be?

Simon states; "*The changes will also mean records tables correctly differentiate between propagation modes versus transmission modes*" This is not correct, in that, with the new records format, there is now only two operating modes (Digital and Non-digital) and those are for EME and Meteor Scatter only, and therefore very restrictive. Whereas before, the existing NZART VHF distance record rules (reviewed in 2004) allowed both of these operating modes to be categorized individually with all contacts, including EME.

So, in my opinion, the existing NZART VHF distance records rules are most pertinent and applicable. They are based upon operating modes that define the degree of difficulty over bandwidth with distance. They are accurate, do align internationally with best practice procedures, do not lead to any propagation ambiguities or discrepancies, are not restrictive, cater for both digital and non digital, and have a proven track record of growth and should be retained as the accepted format, notwithstanding updates to required location data formats, datum's, etc.

Stephen Hayman ZL1TPH
(Member of NZART)

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for a 5wpm test for the Novice pass but he didn't have a tape for that speed so he had to hand send it and this was where things got hilarious. With him trained to 25wpm and me trained to 12 getting down to 5 is not as easy as you might think. If the symbols are coming in at 12wpm and spaced at 5 the business is an absolute doddle but if it is all at 5 it is messy. Letters like B can be written down as TS and things like that. In the end we convinced each other that we both knew a bit about the Morse code and I came away with a Novice qualification. In retrospect this was a mistake because once I had that I lost the urge to go further. I should have persevered and taken the 12wpm but it is academic now anyway.

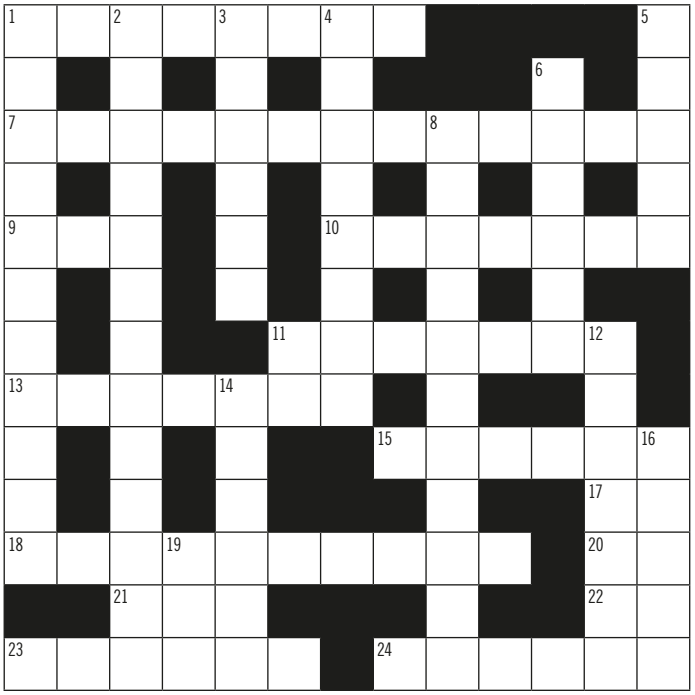
There is no point in continuing this narrative to the present day because recent memory is never nostalgia. Time alone will sieve out what is destined to be memorable. Nostalgia; what the heck!

Thanks very much for these two excellent articles George. They bring back many happy memories.

Roy Symon ZL2KH

ZL Crossword No.16

Compiled by Graeme Hunt ZL1ANH



Across:

1. Born in Erlangen Bavaria in 1879 but not a lawyer (5, 3)
7. and 6 down
   LEDs (5, 8, 6)
9. Hotel (3)
10. Clearly (7)
11. Pasty type (7)
13. The ham shack (7)
15. Perfumes (6)
17. First TVs, not colour (abbrev.) (2)
18. Of the natural features of the earth's surface (10)
20. Country on Europe's fourth largest island – prefix (2)
21. Group of stations with common frequency and purpose (3)
22. Prefix of European country and the abbreviation for its currency before the Euro (2)
23. Help (6)
24. Estimate a result (6)

Down:

1. Process of covering iron with zinc, using electricity (11)
2. Bodies of people united for a particular reason (13)
3. Device in vacuum tubes to remove any gas (6)
4. ZL city where there should be jet boats (8)
5. Sport that began in a Warwickshire borough later famous for its huge radio masts. (5)
6. See 7 across
8. Those skilled in mechanical or industrial methods (11)
11. Prefix of cigar producing country (2)
12. _____ of intrigues (7)
14. Lids (6)
16. A fish does this all the time (5)
19. Get one when you arrive at KH6 (3)

Answers on p40

Next deadline for copy is
10 July 2012

Around the Branches

Auckland branch Fox Hunting (ARDF)

On 21 April Auckland Branch convened an Inter-Branch Fox Hunting Competition in Dingle Dell Reserve in St Heliers. This is a little known area of 16 acres of bush, through which many paths and streams converge onto a pretty dell that was once an estuary. Near its entrance lives Wallace Bottomley ZL1WAL at whose QTH a BBQ was served and the Start and Finish of the event was administered.

Participants arrived with their 2m hand-held sets and home-build tape-measure Yagis. "Hiding" in the reserve were five foxes, though only two people found them all, thus scoring 100 points. Deductions were made for each minute late back after their individually-timed one hour time limit had elapsed. The winner on the day was Vaughan Henderson ZL1TGC representing the Auckland VHF Group Branch and the runner up was Simon Watt-Wyness ZL1SWW representing Auckland Branch. Last year the winners were Tom McDonald ZL1TO and Rod Radford ZL1RK of Franklin Branch.

Amateur Radio Direction Finding (ARDF) Championships are held in each IARU region every year. Last September, Region 3's Championship was held near Melbourne where over 100 competitors arrived from Japan, Korea and China. Such is its popularity in UK that one may compete every weekend at an ARDF event within easy driving distance. 2m and 80m equipment is used. Enthusiasm was voiced to convene another such Inter-Branch Competition next year.

Simon ZL1SWW and Vaughan ZL1TGC; runner up and winner of the Inter-Branch Fox hunting Competition at Auckland 2012.

Hastings Branch
NZ Amateur Radio Day

For NZARD this year at Hastings we were not blessed with the hot weather that we had last year and I believe foot traffic numbers were down as a result.

We set up in good time at the Hastings Town Clock (the clock being a memorial to those that died in the 1931 Hawkes Bay earthquake, this earthquake being the prompt to create the subsequent AREC) and were soon on the air. 40m worked well for us with some 10 contacts spread out over the four hours, about half being with other NZARD stations around the North Island. We achieved similar numbers on the National System.

We found the NZART brochures to be of great value and gave out many to "prospective customers". "Customers" that were eating out in the malls and side walks were targets for promotion of our hobby, again they were given the brochure.

We have our "Amateur Radio Training Weekend" coming up late in March and I'm sure our NZARD will go some way to adding to the numbers for the weekend.

Looking forward to next year to give NZ Amateur Radio another promotion.

David Walker (ZL2DW for HBARC/Br13, Hastings)

ZL2US, ZL 2TC, ZL 2UBG.

Christchurch Branch 05
Jock White Field Day 2012

This year the ZL3AC Jock White National Field Day station was setup in our old haunt by the estuary near the now defunct Pleasant Point yacht club. This site was chosen not only for the excellent ground conductivity of the surrounding mud flats, but this site gives excellent views of incoming Tsunamis.

We had great weather for all of Saturday, and Sunday rain held off until 3pm packing up time. The radio conditions were quite good, 40m held up well but 80m became very quiet during the day as usual, and we collected around 500 contacts on 40m and 400 on 80m. The last hour on 80m was so quiet we thought the aerial had fallen over.

The CW operators had great fun and we really enjoyed refreshing our latent skills.

During setup we experienced a very strange fault on the 80m dipole, it had a persistently high SWR for no apparent reason. We finally concluded it must be caused by some of the antenna still being wired in to the switchboard at the clubrooms; yes, Rory had chopped a bit off the end to repair a recent switchboard explosion. In the end we changed the whole antenna.

There was another incident earlier in the day when the Yaesu FT857D field day radio got run over by a truck on Highway One

Simon ZL1SWW and Vaughan ZL1TGC; runner up and winner of the Inter-Branch Fox hunting Competition at Auckland 2012.

Is that a wave on the horizon.

Magazine Survey

Compiled by Grahame Fraser ZL3SJ
<grahame.fraser@canterbury.ac.nz>

Amateur Radio (WIA)
April 2012

p28 Foundation Corner 19: An introduction to amateur satellites
p40 On sporadic E VHF propagation and solving a mystery about maximum usable frequencies – Part 1

CQ
March 2012

p13 Building Radio Arcala's Monster Yagis (80 and 160 m Yagis on 330 foot tower)
p61 "Opening a Fortune Cookie". Building the Chinese KN-Q7A Transceiver
p64 Learning Curve: Sea-Double-You: The Original Digital Mode

April 2012 QRP Special

p22 The "Splinter" QRPp Trans-Receiver: One Club's Answer to Having Some Fun
p38 Is Anyone Out There ? (more THz propagation; using laser as local oscillator and LiNb03 mixer)
p56 RF Safety In (and Outside of) the Ham Shack
p66 Learning Curve: A QRP (Low Power) Primer

QST
March 2012, Special Antenna Issue

p30 A Coaxial Vertical for 160 and 80 Meters
p33 Remote Tuning for a 43 Foot Monopole (10-200 pF continuously varying capacitor from two discs of PC board)
p38 Webcam Microscope for the Radio Amateur (move the webcam from your computer to just above the SMDs on a PCboard)
p40 Three Wrong Assumptions about the Ionosphere (it is not spherical, smooth or reciprocal)
p43 Your 2 meter Mobile Antenna – What's the Best Mounting Location ? (include your car in NEC modelling)
p46 Review: A Look at Four Antenna Analyzers
p59 Hands-On Radio 110: PCB Layout – Part 4

April 2012

p30 Radio's Role in the Titanic Disaster
p35 Adventures in Adaptive Mobile Operations ("Where you put your antenna is important but where you put your car may matter more")
p38 Level Converter to Allow Full Control of Peripherals by Computer or Radio
p41 A Tube Tester for High Power Transmitting Tubes
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p93 Vintage Radio: An Operator to Remember (Harold Cottam of the Carpathia at the Titanic rescue)`

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RadCom
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in Belfast, (please do not ask why it was in the road) and a substitute radio was donated by ZL3APB. He also brought along his home-brew QRP rig to run his own portable station. We found his QRP rig could work both bands at the same time.

One of the hazards of the site was the deep chasms in the field caused by the recent earthquake. They were quite tricky to see in the dark, but I don't think we lost anyone. At least we had no natural disasters this year, hooray!

Thanks to this year's team; Brian Ramage ZL2BAT, Rod ZL3ROD, Aidan ZL3APB, Rob ZL3RX, Rory Deans ZL3HB, Geoff Cooke ZL2TGC, Richard Smart ZL4FZ, David O'Malley ZL3DO, Paul Layt ZL3TX, Graham ZL3NK, Kelvin ZL3KB.

Also many thanks to AREC for the loan of the trucks, and the CCC farm manager for access. No cattle were harmed in the running of this event (except I had a beef sandwich).

Reporter; *Kelvin Barnsdale ZL3KB*

Geoff Cooke ZL2TGC, Rod ZL3ROD.

Rory Deans ZL3HB, Brian Ramage ZL2BAT.

Beef and Ham trap.

AREC – Amateaur Radio Emergency Communications

Geoff Gillman ZL3QR and Bev Gillman ZL3OV

AREC Mission Statement:
To be the preferred provider of Emergency Communications to New Zealand Emergency Services.

Hi, Everyone. This issue we have a most interesting story on communication experiments here in the Canterbury area. This is still on-going so, hopefully, there may be some updates sometime in the future. On the local scene here in North Canterbury, there have been some changes. After more than twelve years as S/L Geoff ZL3QR has stood down for medical reasons and former Dep. S/L Don ZL3DMC has taken his place.

Tactical HF Deployment for AREC

Introduction

Since 2006, two frequencies in the 5 MHz (60 m) band have been made available for AREC operational use. The use of these two spot frequencies is by agreement with the original licensee and subject to a number of specific rules.

During this period, Christchurch Branch 05 AREC has, on a number of occasions made use of these frequencies with varying success. More recently, the team has been looking at a number of factors associated with successful deployment of HF radio in a tactical sense. Search and Rescue operations in and around the Canterbury area often demand the use of HF radio as the ability to deploy VHF repeaters can be severely constrained.

This article describes a recent HF deployment to provide communications for the Classic Kayak race over a section of the Waimakariri River Gorge and some of the decisions and learning points that have come from that operation.

Operational Use of HF

Each year the Christchurch AREC team has provided communications for the river sections of the Coast to Coast Multisport event, and the Classic Kayak race on the Waimakariri River. The course is over the river section between Mt White Bridge near Arthurs Pass and Gorge Bridge near Springfield. The river section comprises sections of a steep walled gorge and follows a winding course as it heads east and south from Mt White to Gorge Bridge. Communications are required between a number of shore stations and jet boats providing safety cover and marshalling for the kayak competitors in both races. This terrain means that even using repeaters, VHF and/or UHF options are limited leaving a significant role for HF radio.

In recent years the solar cycle has been at or near the sunspot minimum, causing less than ideal HF propagation conditions. This caused a greater challenge as we have attempted to provide reliable communications throughout the day and over the entire course. Although the Coast to Coast event extends well into the evening, the river section is completed by dusk, with the remaining cycling and running sections covered using VHF.

Significant points:

- Total course length (as the crow flies) is approximately 35 km (although the competitors cover 67 km)
- Number of shore stations is at least five (although there may be more depending on river conditions)
- Mobile operation is required (in jet boats) using HF whip antennas
- Space is at a premium in some of the locations

Tactical HF Deployment

Tactical deployment in this context is the establishment of communications for a defined period and to cover specific area or locations. It differs from the more normal HF communications enjoyed by Amateurs where the goals are usually distance and/or the greatest number of different stations that can be worked; but the ability to stay in near continuous contact is not a requirement.

The goal of tactical communications is to be able to communicate effectively as and when required between stations for the entire duration of the event. This means that consideration must be given to these elements

- Antenna selection
- Operating mode
- Frequency selection(s)
- Terrain

The specific solutions to a tactical deployment will vary from place to place, with time of year, time of day and operating conditions. In the particular circumstances described above, some of these issues are:

- Short overall distances (as the crow flies)
- Limited options for antennas on jet boats
- Daylight operation timeframe with early morning start and often a late night finish

As indicated above, the short distances coupled with the very radio unfriendly terrain dictate a need to deliberately utilize Near Vertical Incident Sky-wave (NVIS) operation. This decision directly impacts on the choice of frequency(s) and the style of antennas.

The term "deliberately utilize NVIS…" perhaps needs further explanation. It is well known that the vertical radiation pattern of a half wave horizontally polarized dipole antenna has a null or radiation minimum at 90° (straight up) when the antenna is at least ¼λ above the ground. This immediately presents a practical problem in that ¼λ for 80 m is some 20 m above ground and even for 40 m a ¼λ is 10 m above ground; not normally practical options for portable operation.

By mounting the antenna lower, the angle of radiation increases until at about 0.15λ, it reaches a maximum at 90°. Reducing the height further the maximum radiation still occurs at 90°, but the amplitude decreases (i.e. the gain reduces) as the antenna gets closer to the ground.

The short distances involved for this course (35 km as the crow flies) mean that the launch angle for our signals needs to be at about 85° to bounce down again where we need it (at the furthest point), indeed nearly vertical.

Deliberately utilizing NVIS operation means setting up antennas that make the most of NVIS characteristics and using frequencies that offer the best NVIS performance.

For about the last three years or so, the sunspot activity and general HF conditions have not been especially good with T index values being close to or less than zero. Only in the last twelve months has the T index started to rise significantly. This has meant that in the early morning and late afternoon, the optimum frequency choice has largely been confined to 80 m. Signal strengths have been fair to medium for shore stations and have decreased during the middle period of the day.

Jet boat signals have varied from usable in the morning to needing station by station relays later in the afternoon. Last year, for the Kayak race in early December, we made some conscious decisions around the HF configurations.

Looking at NVIS operation, it is generally recommended that the optimum working frequency is 80% of the MUF (Vertical) or fof2 as it is referred to by the Ionosphere Predict ion Service operated by the Australian Government <www.ips.gov.au>

Checking the IPS website for the area and dates, and working within frequencies and bands available to AREC, this suggested that this time operation at 5 MHz would be the best option for this particular event.

NVIS Antenna options

Considerable reading and research into NVIS antenna operation has revealed some interesting information. Of course the problem with research is that some practical comparisons are needed to confirm which elements do actually work in the local context!

Some of the findings were that;

- Optimum antenna height for NVIS operation of horizontal dipole antennas is between 0.1 and 0.15 wavelength
- That as the antenna height is reduced below 0.1 wavelengths, the vertical gain reduces and could reduce by more than 10 dB depending on final height and ground conditions
- That lowering the antenna below 0.1 wavelengths may improve the Signal to Noise ratio as distant electrical noise pickup is minimized
- That using an "inverted vee" configuration at the same average height as the horizontal dipole introduces as much as 6 dB (vertical[1]) performance penalty
- Horizontal dipoles at NVIS heights are essentially omni-directional (in respect of the horizontal radiation pattern) and do not exhibit the normal nulls from each end.
- Point 1 presented a problem! For 80m operation, the optimum height for max vertical gain was approximately 8.3 m (about 27')

at 3.6 MHz which is difficult to achieve. At 5 MHz this improved to 6 m (about 18')

- Practically we can usually (easily) achieve 3 to 4 m to support a horizontal dipole, so our vertical gain would be noticeably reduced.
- The average height of an "inverted Vee" at the peak at 8 m is 4 m, but there would be an additional penalty of approximately 6 dB incurred; not a good idea if we have to operate at lower than optimum!

On the day we had two stations reasonably near each other (although separated by terrain), one equipped with an inverted Vee and the other with a horizontal antenna. The difference in path length was about 3 km. The additional gain from the horizontal antenna was particularly noticeable as the day passed, and signals from this station which were much more reliable for a greater portion of the day.

Jet boat operation with whip antennas did, and still does, present problems. The whips are understandably lower in efficiency, and can hardly be described as being an ideal installation. To maximize the signal being radiated upwards instead of at a low take off angle, we followed advice to bend the whips over as much as possible.

Unfortunately, although we achieved useable signals, there are other factors that have meant that we are unable to be as certain as to how much of an improvement may have been obtained. We did note however that, antenna tuners are required to compensate for the detuning caused by bending in proximity to the hull. The detuning can cause the base impedance of the antenna to change enough that the transmitter will start to reduce power (VSWR protection).

Frequency Selection

Operating at or about the 80% of the MUF is the ideal. Unfortunately, the available amateur bands and frequencies (e.g. 5 MHz) do not always fall nicely for this. The other factor that needs to be considered is that the MUF changes during the day and night, and generally rises around the middle of the day to early afternoon.

Operating too far below the MUF can mean that signals are lost with increased absorption by the D and E layers as they are ionized by the sun.

During the kayak race, we found that the received signal strengths fell significantly towards midday and during the early afternoon. To overcome this we had to relay signals from boats via one or more shore stations.

Later investigation using Local Area Mobile Prediction (LAMP) charts produced by the Australian Government prediction service, suggested that better results would have been achieved by operating on 7 MHz (40 m) for this part of the day. During this period the horizontally polarized shore station antennas were generally noted as having performed better than those stations with inverted vee antennas.

One of the problems with having to change frequency is that of coordination. To be safe really requires that the base station must have receivers operating on both frequencies at all times (two receivers and two antennas). This catches those stations that cannot make contact on the expected frequency and may try the second choice. Two frequency operations can also cause practical problems. Shore stations are limited in the amount of kit they can take and may have restrictions on available space at the selected location. It needs to be remembered that shore locations are determined by operational needs – not suitability for radio operations.

Final Thoughts

Although the section has provided communications over this part of the river many times, there are still opportunities to try new (different) techniques. This time we were able to confirm that deliberately attempting to optimize NVIS operation with our selection of antenna options and frequencies can provide tangible benefits.

We have noted that greater attention to frequency selection(s) is needed. Whilst the use of 5 MHz during the early part of the day worked very well, we needed to consider the option of a change to 7 MHz later on. Obviously multiple frequency operation brings risks as well as potential reward.

Antenna tuners were beneficial on shore stations where antennas that were low to the ground and presented lower feed impedances. The resultant VSWR could then be easily managed. We will look at further use of antenna tuners for both shore stations and jet boat mobile operations.

The availability of 5 MHz frequencies definitely provides useful options for tactical HF deployment. With the current state of the sunspot cycle, 3.5 and 7 MHz are too widely separated to be able to provide consistent HF operation between specific locations. 60m provides AREC with a valuable option in establishing a communications circuit.

Richard Smart ZL4FZ / ZK9EA

Activity Briefs

(A selection from Jan / Feb.)

1/1/2012. Wairarapa Branch 46. SAR. Search in the Holdsworth area for a 45 yr old American tourist tramping on his own and failed to turn up at the agreed time. The local helicopter with a Police officer checked the hut logbook and found he was intending to walk out to Walls Whare. He was intending to go around the Powell-Jumbo circuit, but met a couple at Rocky Lookout who suggested Totara Flats is a nice place for camping. So even though he did not have a map of the area he went down to Totara Creek, he lost the track going down towards Totara Flats and did not get there until Friday or Saturday night, he was pleased to find the hut and dry out. He then tried to find his way out by going down stream where there the helicopter located him in the river.

6/1/2012. Tauranga ECG Branch 88. Sports & Training. Tauranga Domain, Tauranga. The North Island Colgate Games being held at the Tauranga domain from 6, 7, 8 January 2012.The local Athletic club is expecting over 6300 people to be involved from athletes aged from 7 to 14 years of age, parents, grandparents, and a number of officials. Over 1800 athletes are also expected. The role of AREC is to supply 10 VHF handhelds and one VHF base station, charging station and spare batteries for the duration of the games issued to marshalls covering each event. Instructions for using handheld radio's and procedures for marshalls. establish base station in announcers box using ESB07 simplex.

7/1/2012. Marton Branch 23. SAR. West of National Park Village. Missing day tramper, female age 25, lagged behind group of 3 and became lost on return from day trip. Found next day at 1130hr fit and well, located by helio when inserting search teams. Ops concluded by 1430hr.

11/1/2012. Manawatu Branch 20. SAR. Whariti. Missing person. Missing person returned to station.

15/1/2012. Wellington VHF Group Branch 74. SAR. SAROP Titahi Bay. Missing Swimmer. SAROP land and sea search for missing swimmer. MP body washed up a few days later and found by Police.

16/1/2012. North Canterbury Branch 68. Rural Fire. Eyrewell Forest. Forest on fire. NZFS units searched for supposed fire. Nothing found. Forestry unit which had far greater distance to travel, was turned back while en route. Extensive lightning activity far to the East of the forest, is believed to have given a false impression of a fire to those who called it in.

24/1/2012. Wellington VHF Group Branch 74. SAR. SAROP Missing day walker called in lost. Day walker left track and got lost. Phoned police when injured himself. MP found on track the next day at 11.00.

28/1/2012. Wairarapa Branch 46. Sports & Training. Provide Comms for Annual Jumbo - Holdsworth Trail race and Hooper Loop race. 82 competitors on the main race and another 60 on the Hooper loop race. Several runners turned back as they missed cut-off time to top or just pulled out due to weather.

3/2/2012. South Canterbury Branch 34. SAR. 9km SSW from Fairlie, South Canterbury. A search for a hunter overdue the previous night. He had fallen and lost consciousness. He was found by helicopter on its last pass before search teams were sent in. AREC set up base at the Fairlie Police Station ready for the waiting search teams to be tasked. A radio check was the

continued on page 32

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only message before person found.

3/2/2012. Wairarapa Branch 46. Sports & Training. Wairarapa Fishing Club-Superfish event at Castlepoint. Provide comms for Annual Superfish fishing competition held at Castlepoint over 2 days. 20 boats with 2-5 anglers per boat plus land based anglers. All comms on AREC Marine repeater CH18. No problems with comms apart from faulty radios and aerials in boats due to lack of maintenance.

5/2/2012. South Canterbury Branch 34. SAR. Little Mount Peel. A tramper had phoned to say he was lost in poor visibility on Little Mt Peel. With phone battery going flat could only receive txt, but was guided back to track, found by search team and guided out. AREC had set up base at the Geraldine Police Station operating VHF when missing person was found.

6/2/2012. Motueka Branch 24. Sports & Training. Motueka River valley. Provide comms for annual Motueka river Raft Challenge, at Alexander Bluff bridge, checkpoint at end of Whakarewa St., and finish at Motueka bridge. Six kayakers on the river had Tait handhelds. AREC operators on land had ICOM handhelds. The weather was fine and sunny. There was only on incident. Comms Control was alerted by a kayak that two rafts hit rocks in a fast flowing section of the river and disintegrated. The kayak rescue team were immediately despatched to the scene. Luckily no one was hurt but it took a couple of hours to get the wreckage off the rocks. Hot food and cold drinks were provided at the Motueka bridge by locals.

13/2/2012. Papakura Branch 65. SAR. Huia, Auckland. Two trampers over due to come out from a days tramp. Found by Police Eagle helicopter beside a stream with no walkable track.

13/2/2012. Manawatu Branch 20. SAR. Whariti. Missing female found deceased.

15/2/2012. Thames Branch 41. SAR. Opoutere, near Pauanui. Search for 84 year old fit experienced tramper overdue. Found next morning cold and wet.

17/2/2012. Wairarapa Branch 46. Sports & Training. Ngawi Big 3 Fishing Competition. Provide comms for annual fishing competition for boats entering and leaving the water. 132 boats with 1 day cancelled due to bad weather conditions.

22/2/2012. Otago Branch 30. SAR. Taieri Gorge, Dunedin. Search for 2 male university students who were overdue from a rafting trip in the Taieri Gorge from Hindon to Outram Glen. The Civil Defence Emergency Communications Unit was deployed to Taieri View Rd where the ESB 57 Repeater was setup. Teams were deployed with VHF hand held radios and POLSAR HF radios. The missing party was located some 5 hours into the search when they arrived at Outram Glen.

Conclusion

Thanks to those who have contributed to this issue. Material for the next one to please be in our hands by 3 May 2012. Photos, if included. preferably on a separate CD (with captions) mailed directly to us. E-mail pix may be acceptable but will be at the Editor's discretion and must not be embedded in the text. Contact details: <zl3qr@nzart.org.nz> or <zl3ov@nzart.org.nz> or post to 6 Boyd Street, Rangiora 7400, or phone (03) 313 7137.

(N/B. Articles to please be in doc. rtf or txt format. Publisher or pdf we can not use. Thanks.)

Reminder

The next Section Leaders Nets should be 16 April and 25 May, 3900 kHz USB at 1930 hr NZST unless notified otherwise.

Until next issue,

73, *Geoff ZL3QR & Bev ZL3OV*

References

[1]This is specifically for VERTICALLY directed radiation (NVIS operation). This is not the case for low angle (DX) operation, where the inverted vee is a good antenna for medium distance working.

[2]In respect of the sky-wave component only! The ground wave remains directional as expected.

QSL Bureau

by Barry Stewart ZL2RR
<zl2rr@xtra.co.nz>

Greetings from a rather cool Wanganui. My aging bones are feeling the cold somewhat these days so I may see more time in the radio shack over the next few months.

The last day of 2011, our small party departed Taumarunui in canoes heading for Pipiriki. New Year's morning saw the river raging with rain falling and late that afternoon the lorry turned up to pick up the canoes and us for a return to Wades Landing and in the process I slipped on the wet grass and badly twisted my ankle. I left the emergency department of the hospital next afternoon after five hours sitting around waiting for the welcome diagnosis of a bad strain, not a break. As a result, the Central QSL Bureau was closed whilst I was absent from home for twelve days early March revelling in some of the delights of the deep South; namely the Humpridge and Dusky tracks. The Dusky was on our 'bucket list' and our mainly geriatric party was pleased to have made it before we were all too old to handle it!

After nearly two weeks away, I came home to few cards awaiting me at the Post Office. The twelve thousand-odd cards that arrived during the first six weeks of 2012 had reduced the inward flow some-what!

Looking forward to the last eighteen hours of the CQ WPX SSB Contest at the end of March kept me going but it wasn't to be memorable: an hour into the contest and my voice gave up the ghost. I managed to croak my way through the last few hours on Monday morning for a very small return.

To date, early May, twenty thousand DX QSL cards (12 000 – 2011) have been received at the QSL Bureau so the managers of the Sub-bureaux have been somewhat busier this year. This year's postings include ZL1's Sub-bureau having 5 kg parcels of QSL Cards posted to it in January (2), February (1), March (1) and May (1). ZL2's Sub-bureau 5 kg parcels were Jan (1), Feb (1) and March (1). ZL3 Sub-bureau 700 g envelope postings were Jan (5). Feb (1), March (4) and May (2) whilst ZL4's were Jan (4), Feb (2), March (3) and May (3).

Recently received postings included PA – 1167 QSL Cards, W – 1318 cards, EA – 1171 cards, BV – 135 cards, E7 – 504 cards and JA – 2388 cards.

New Zealand Post is at it again: Luckily, this time the increases will not have a major impact on the QSL Bureau expenses. Postage for the 700 g envelopes will increase from $1.80 to $2.10 and the charge for Box 857 will increase by $10.00.

Self-addressed stamped envelopes (SASEs) will now require 70c stamps affixed to them from 1 July. Please supply your Sub- bureau manager with sufficient 10c stamps to cover the SASEs of yours that he has on hand. Please use the Kiwi Stamps on any future SASEs you supply your Sub-bureau manager. These stamps remain valid postage for a standard letter whatever the postage rate changes to and save hassles for the Sub-bureau Managers when such an increase takes place.

I have had a request to rerun the following e-mail: It says in part: "Hi, I have been collecting NZ Ham Radio QSL Cards for the last six months: I myself do not have a radio I just collect them out of interest and helping to preserve the history of them. I have done a data base on the computer to keep track of what I have, also would you have any idea where I would be able to get other ZL QSL cards from people who do not want them anymore?" Thank you, Regards Donna Stenhouse. If you can assist Donna, please e-mail her at <gwstenhouse@xtra.co.nz>

On behalf of NZART, I thank those members who include a donation with their QSL cards from time to time. This assistance with helping to assist in reducing the Bureau's operating costs is most welcome. The postage expenses keep increasing: give up E-mailing and support NZ Post!!

If you have any questions, queries (QSL managers' addresses, etc.) or comments please feel free to contact me either via mail (1 Caversham Road, Westmere, Wanganui 4501 or PO Box 857, Wanganui Mail Centre 4540), or Email: <ZL2RR@xtra.co.nz>

73 *Barry ZL2RR*

FMTAG – Frequency Management and Technical Advisory Group

Secretary: Doug Ingham ZL2TAR
<fmtag@nzart.org.nz>

NZART Council revises its licence fee policy

As mentioned in "From the President" (page 3 March/April *Break-In*), NZART Council has revised its Beacon, Link and Repeater Licence Fee Policy. Here are more details.

Council resolved to encourage the transfer of Repeater, Beacon and Link Licences from NZART to the equipment-owning Branches, and to impose a surcharge of $5.11 per licence, to offset NZART HQ costs, on those licences that remain with NZART.

The MED's Annual Administration Fee, for an Amateur Beacon, Link, or Repeater Licence, is $46.00, if paid by credit card via the MED's SMART website, or $51.11, if paid by cheque to the MED's Business Service Centre. The $5.11 surcharge recognises the cost to the MED of processing a manual payment.

Previously, NZART HQ requested payment of $46.00 from Branches and forwarded the full amount to the MED.

The NZART HQ cost of processing a manual payment are similar to those of the MED and, therefore, NZART Council decided to introduce the same $5.11 surcharge per licence for all Licence Fee payments made via NZART HQ.

As at the 10 of May, the following Branches (and Affiliates) had not started the licence transfer:

03 Western Suburbs
05 Christchurch
08 Eastern Southland
22 Marlborough
23 Marton
24 Motueka
26 Nelson
28 Whangarei
33 Rotorua
34 South Canterbury
35 South Otago
37 Southland
38 Taumarunui
42 Titahi Bay
46 Wairarapa
48 Wanganui
49 Westland
51 Eastern Bay of Plenty
55 Waitomo
56 Christchurch West
61 Central Otago
64 North Otago
66 Auckland VHF
67 Kawerau
78 Far North
82 Southern Wairarapa
84 Bay of Islands
85 Mercury Bay
86 Suburban
87 South Taranaki
Auckland AREC
CARDS

Branches wishing to avoid paying the $5.11 surcharge for each licence need to arrange transfer of their licences from NZART to the Branch. To start the licence transfer process, please send an email to FMTAG to receive an information pack: <fmtag@nzart.org.nz>

NZART Council has confirmed that the revised policy does not apply to National System or International Beacon Licences.

Proposals

None this time

Final recommendation to NZART Council

NZART Council, at its 1st of May meeting, approved the following Final Recommendation, which can now proceed to licensing.

Branch 74 Wellington VHF has applied for an APRS Digipeater at Kaiwharawhara Hill, located at TOPO50 BQ31 494.93 316.03. The transmit and receive frequency will be 144.575 MHz in accordance with the band plan. An engineering investigation, in accordance with MED PIB38, confirms that there will be no interference to other stations.

Comments and Applications

Please send your comments and suggestions on the above matters, and on any other FMTAG matters, by e-mail to: <fmtag@nzart.org.nz>

Applications for repeaters, beacons, digipeaters, point-to-point links, and so on, should be made on the latest version of FMTAG Form 10. The latest versions of FMTAG Form 10, and the explanatory Form 10A, are available on the NZART website: <http://<www.nzart.org.nz/fmtag/index.html>. Completed forms should be sent by e-mail to <fmtag@nzart.org.nz>

The current status of Applications can be viewed on the NZART website: <http://<www.nzart.org.nz/nzart/fmtag/fmtag-apps-being-processed/>

Awards

Awards Manager: Alan Chapman ZL3GX
<awards@nzart.org.nz>

This month I have included the second most popular award that I issue. It is the Worked All Pacific Award and the requirement for the award is 30 different Oceania countries. The list of the countries can be found in the DXCC Countries list in *Call Book*. (Marked OC in the 'Cont.' column.) Those of you who have been working DX may be able to find sufficient contacts to enable you to apply for the award. There are log sheet available from the NZART web site under the awards section. Alternately sending an email to the Awards Manager and I can send you a copy. Both addresses are at the bottom of this column. You can just use a plain sheet of paper but please include the country in your log.

WAP – Worked All Pacific

Contacts required with 30 different "Oceania Countries".

Eligible countries; Any Oceania country, i.e. eligible as Oceania for WAC. (See DXCC list) Cost $3.00, overseas $5.00. Please include the country on log sheet.

If you are a keen DXer then you may have sufficient contacts for the Five Band WAP. I have issued this award for up to nine bands.

Five Band WAP

Contact any 30 eligible Pacific Countries (as counting for Oceania for WAC), each on FIVE different bands making a total of 150. (6, 7, 8 or 9 bands also available.)

Send list of log extracts (QSLs not required to be held) to NZART Awards Manager with $15.00, overseas US$25.00.

AWARD: Wooden Shield surmounted with NZART badge and suitably inscribed.

Paper version available $5.00 overseas $US5.00.

Club Awards

Clubs running short-term awards or new awards should send details of the award to me via email or at my *Call Book* address or the address below. Remember that *Break-In* is only published on even months and copy, including, if possible, a copy of the certificate, for inclusion, should reach me by the end of the even month.

The Awards Net runs on 80m, 3.677 MHz every night from 0800 UTC every night of the year. Every one is welcome to join in especially if you are mobile and in a rare county or district.

NZART Awards Manager, PO Box 1733, Christchurch 8140, <awards@nzart.org.nz>, <www.nzart.org.nz/activities/awards/>

The New Zealand
Association of Radio Transmitters
(Incorporated)
WAP
"WORKED ALL PACIFIC"
AWARD No: 2000
MODE: SSB
ZL AWARD No: 3
This Certifies that
Sample ZL3XYZ
has this day submitted satisfactory evidence of having conducted two-way communication by amateur radio with at least 30 different countries in the Pacific Area. This certificate is issued in recognition of this meritorious performance.
Alan Chapman ZL3GX - Awards Manager
Date: 24 May 2010

WAP Award Certificate – black lettering on gold card.

The International Monitoring System Michael Owen VK3KI; Chairman of IARU Region 3

Why is the IARU Monitoring System so important?

It is because the ITU's Radio Regulations say that an administration does not have to assign its stations frequencies in accordance with the Table of Frequency Allocations so long as its stations do not cause harmful interference to a station operating in accordance with the Radio Regulations. Accordingly, if amateur stations suffer harmful interference they must complain, because until the administration knows that its station is causing harmful interference to stations operating in accordance with the Radio Regulations it can take the position that it is not in breach of the Radio Regulations. It is one of the few activities apart from its role in the WRC process that many argue is an essential IARU role.

For many years the IARU has maintained the International Monitoring System, relying on the three Regional organisations appointing Regional Monitoring System (MS) Coordinators who, in turn, collated the reports of the Coordinators in each national member society, who in turn collated the reports of the observers in their country. All of this was intended to work under the guidance of an International MS Coordinator.

In fact, there has not been an International MS Coordinator for many years, each Region had different methods and procedures and the processes established by the Administrative Council to facilitate inter-regional communication were to say the least bureaucratic and ineffective and were largely ignored.

There is no doubt that the IARU Region 1 MS, under the leadership of Coordinator Wolf Hadel DK2OM and Vice-Coordinator Ulrich Bihlmayer DJ9KR has set the standard for the regional monitoring systems, with a technically up to date and really useful website and methods and procedures that really work.

If you look at the IARU Region 3 website, you will find that it is still using a 1988 Manual, although under the leadership of IARU Region 3 MS Coordinator Peter Young VK3MV the MS has been operating effectively and collaborating efficiently with the other Regional coordinators.

The IARU Region 3 Directors raised the issue at the last IARU Region 3 Conference in Christchurch, New Zealand, in 2009. The MS became the major work of the Conference, with the member societies seeing advantage in a more truly global system, identifying a number of areas where they considered a common approach was desirable and referred the matter to the Administrative Council of the IARU.

The Administrative Council is comprised of the IARU Officers and two representatives from each of the three IARU Regional organisations, IARU Regions 1, 2 and 3, and is the peak policy organ of the IARU.

The Administrative Council has now agreed on a very new approach. It has given away the idea of an International Coordinator and the complex process for inter regional communication and replaced it with the much simpler and totally logical structure of a single Monitoring System Committee comprised of each of the three Regional MS Coordinators and the President of the IARU, or his nominee.

By the Resolution of the Administrative Council establishing the IARU Monitoring System and the Terms of Reference of the Monitoring System Committee, the Committee will be responsible for the establishment of a single worldwide website, based on the Region 1 website, establishing common methods of communication and reporting and the preparation of appropriate training material.

Indeed, it has all started, with the IARU President communicating with the three Regional MS Coordinators and the Monitoring System Committee starting its work. That all sounds very well, but is it all worth the effort? Is anyone going to take any notice, anyway? Simply collating reports of harmful interference from stations not operating in accordance with the Radio Regulations doesn't achieve much.

The way it is all meant to work is that the national society in the country of the intruder goes to its administration and asks its administration to stop the interference. And that is what happens in a number of cases. But in other cases, the national society may not wish to do that. Other administrations may be prepared, once they have confirmed the reports provided by the national MS Coordinator, to approach the administration of the station causing the interference.

The new Monitoring System Committee, ultimately with one method of reporting, with better coordination and focus and a single source of current information, should make this important task more attractive and more meaningful and attract new observers and in the end provide more credible observations and a better focused approach to removing "intruders".

- No, it doesn't always work.
- But if we don't complain, who will?
- Doing nothing is not an option.

Shozo Hara JA1AN

Last November JARL announced the retirement of its President Shozo Hara JA1AN and the appointment of Akira Inage JA5MG as its new President. That change was a change that we, the international amateur radio community, should mark with a special tribute to the retiring JARL President.

Shozo Hara was over 80 years old when he retired, and had been JARL President since May 1970, that is more than 41 years. Before that he was a Director of JARL from May 1952, the year he was licensed as JA1AN. He was JARL Vice-President from May 1968 to May 1970.

Shozo had graduated from Waseda University where had majored in electrical engineering. His other great passion is the Japan Equestrian Federation. He has been President of the Federation and is currently its Supreme Advisor.

But it is not Shozo's many achievements that I wish to record, rather the importance of his support of international amateur radio and his support of the IARU and IARU Region 3. I remember seeing Shozo at a number of the ITU Conferences over the years, and I always recall his presence at so many of the Regional Conferences. Shozo was very conscious of the role of JARL, for many years the largest society in Region 3, with JARL providing a secretariat to back up the Secretary, and administrative support at the triennial Conferences. He strongly supported the Region and demanded much of those who undertook roles in the Regional organisation.

I value and thank JA1AN for the support that he has given the IARU and IARU Region 3 over so many years, and wish him well in his retirement.

Michael Owen

"WRC-12 (World Radiocommunication Conference 2012)

As reported by Shizuo Endo JE1MUI.

WRC-12 was held in Geneva from Jan 23 to Feb 17, 2012. The IARU attends a WRC as an observer, and its Observer Team at WRC-12 was led by IARU President Tim Ellam VE6SH. Naturally, as an observer, the IARU is very much restricted in what it can do publically at a meeting of sovereign states. However, a number of administrations will include an amateur on the nomination of its national amateur radio society, which meets the costs of that delegate. While subject to their national brief these amateur delegation members are often able to speak at the various meetings and influence the outcome.

At WRC-12 three of the IARU Region 3 member societies were able to nominate an amateur as a member of their national delegation; JARL Japan, Ken Yamamoto JA1CJP; NZART New Zealand, Don Wallace ZL2TLL; and WIA Australia, Dale Hughes VK1DSH. Interestingly, it was a first WRC for each of them. Dale, for example, was appointed by the APG as spokesman for the APT on the common position on agenda item 1.23 as well as chairing a drafting group during the WRC.

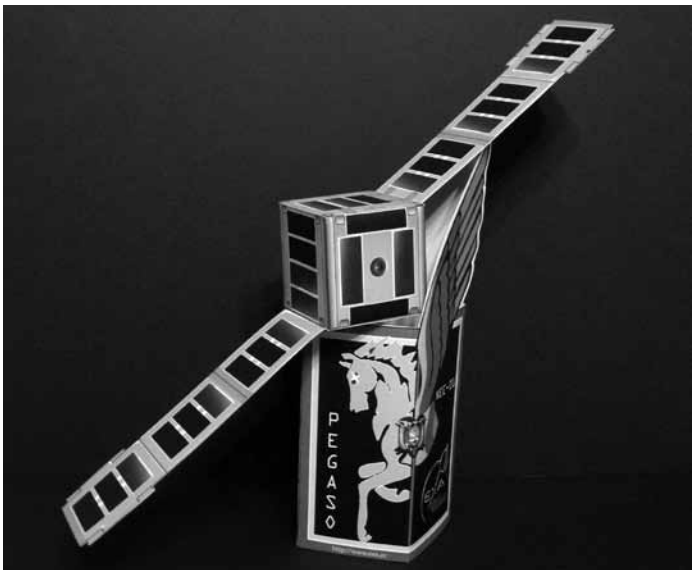
Each of these national delegates, as well as the delegates nominated by national societies in Regions 1 and 2 and the IARU Observer team, contributed to the success of the amateur position at WRC-12. In supporting a member of the national

Satellite Orbits

Andrew Barron ZL3DW
<ad.barron@xtra.co.nz>

There are plans for lots of new ham transponders in space over the next two years. UKube-1, the first satellite to be built in Scotland, is being built at the West of Scotland Science Park in Maryhill, Glasgow and is expected to enter orbit in 2013. It will carry a set of AMSAT-UK FUNcube boards to provide a 435/145 MHz (U/V mode) linear transponder for SSB/CW amateur radio communications.

Ecuador's first satellite NEE-01 Pegasus is slated to launch this October from Yasny on a DNEPR rocket. Pegasus is a 1U CubeSat with two large deployable solar panels. The Ecuadorian Civilian Space Agency (EXA) indicates that 28.8 A can be generated. There is an onboard camera to send live video from space from a 3 W TV transmitter in the 902 MHz band along with a beacon that will send an ID and Ecuador's national anthem. Pegasus will help to monitor near-earth objects from orbit using its onboard 720p HD video camera and will also help in the catalog and control of orbital debris (space junk). It is intended to be the first online, real time orbital video sentry for the planet, as the satellite has the capability to stream its video signal directly to the Internet.



Ecuador's first satellite NEE-01 Pegasus.

New frequencies have been announced for the AMSAT-UK FUNcube-1 satellite due to launch on the same rocket as NEE-01 Pegasus later this year. This launch may carry as many as 10 amateur radio satellites into space. As a result the International Amateur Radio Union (IARU) satellite advisory panel has had to carefully coordinate the planned operating frequencies in order to minimise the risk of interference between FUNcube-1 and other payloads on the same launch. The new frequencies for the inverting linear transponder are; uplink 435.150 – 435.130 MHz, downlink 145.950 – 145.970 MHz, and telemetry: 145.935 MHz BPSK

The Ankara-based Amateur Satellite Technology Association (TAMSAT) is developing their new CubeSat TURKSAT-3USAT. It is to be a three unit CubeSat developed for voice communication at low earth orbit. The payload is a VHF/UHF transponder operating at amateur bands. The transponder and all other subsystems, except the stabilization, are doubled for redundancy. The energy is provided using lithium polymer batteries together with super capacitors. Satellite stabilisation is accomplished using passive magnetic attitude control system with hysteresis rods. The satellite is to include a de-orbiting system which will make it re-enter the atmosphere following completion of its lifetime. TURKSAT is expected to launch near the end of 2012.

On April 28, 2012 the nano-satellite Delfi-C3 (DO-64) celebrated 4 years in orbit and is still alive and kicking! This 3-unit CubeSat, developed by the Technical University of Delft in the Netherlands was largely developed by students. After being launched on PSLV-C9 in 2008 it has been circling the earth for more than 1461 days, very successfully exceeding its design lifetime of 90 days. The satellite still broadcasts its telemetry and measurement data which can be received using simple amateur radio equipment and using the RASCAL software (available on the Delfi website: <http://www.delfispace.nl/index.php/participation/radio-amateur-participation)>.

Hope for Hope Sat? HO-68's transponder, repeater, and packet system have been inoperative since January 2011. Their return is uncertain.

Oscar-65 Cute-1.7 now has it's Mode L/U Digital Digi-peater turned on 24x7

For now, Fuji-OSCAR 29 FO-29, VO52 and trusty old AO-07 seem to be the best bet for SSB activity. VO-52 is operating on the Dutch transponder because the primary 'Indian' transponder has failed after 6 years of operation. Saudi-Sat SO-50 is the best bet for FM, in fact I think it may be the only FM satellite currently operating. ARISS seems to be permanently in crew active mode, with the repeater function disabled.

As always I am keen to hear about and publish details about your satellite activities, so please drop me an email to <zl3dw@nzart.org.nz> and photos are especially useful. I am also very happy to answer any questions that have you puzzled or will help you get started.

73 *Andrew ZL3DW*

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delegation a society accepts a very heavy financial burden; particularly hard for smaller societies such as NZART. Michael VK3KI, on behalf of the IARU Region 3 Directors, said it was important that we all recognised this important contribution by our member societies. Following are highlighted as good achievements for our amateur fraternity

In connection with Agenda Item 1.23 "to consider an allocation of about 15 kHz in parts of the band 415-526.5 kHz to the amateur service on a secondary basis, taking into account the need to protect existing services", Frequency band 472-479 kHz is allocated on the secondary basis under the following conditions.

1 The maximum equivalent isotropically radiated power (e.i.r.p.) of stations in the amateur service using frequencies in the band 472-479 kHz shall not exceed 1 W. Administrations may increase this limit of e.i.r.p. to 5 W in portions of their territory which are at a distance of over 800 km from the borders of Algeria, Saudi Arabia, Azerbaijan, Bahrain, Belarus, China, Comoros, Djibouti, Egypt, United Arab Emirates, the Russian Federation, Iran (Islamic Republic of), Iraq, Jordan, Kazakhstan, Kuwait, Lebanon, Libya, Morocco, Mauritania, Oman, Uzbekistan, Qatar, Syrian Arab Republic, Kyrgyzstan, Somalia, Sudan, Tunisia, Ukraine and Yemen. In this frequency band, stations in the amateur service shall not cause harmful interference to, or claim protection from, stations of the aeronautical radio-navigation service.
2 The use of the frequency band 472-479 kHz in Algeria, Saudi Arabia, Azerbaijan, Bahrain, Belarus, China, Comoros, Djibouti, Egypt, United Arab Emirates, the Russian Federation, Iraq, Jordan, Kazakhstan, Kuwait, Lebanon, Libya, Mauritania, Oman, Uzbekistan, Qatar, Syrian Arab Republic, Kyrgyzstan, Somalia, Sudan, Tunisia and Yemen is limited to the maritime mobile and aeronautical radionavigation services. The amateur service shall not be used in the above-mentioned countries in this frequency band, and this should be taken into account by the countries authorizing such use.

As an agenda item for the WRC-15, Agenda item 1.4 "to consider possible new allocation to the amateur service on a secondary basis within the band 5 250-5 450 kHz in accordance with Resolution 649 (WRC 12)" was adopted.

The statements or opinions in this Newsletter do not, unless otherwise stated, necessarily reflect the views of IARU Region 3, the Directors or the Secretariat.

WARO – nz womens amateur radio operators

with Topsy ZL2LS, Sharon ZL2BQ and Ngaire ZL2UJT
<waro@nzart.org.nz>

Hi to everyone. Hope you are still enjoying the beautiful autumn weather or maybe by the time you read this it will have turned to custard, and we will all be snuggled by the fire. Lots of activity throughout the country Radio wise with girls getting involved in Fox Hunts, sourcing repeater sites, awards, nets and generally enjoying our hobby of radio. We don't all have to be involved in everything, and many are just happy to talk with friends on air. I was just talking to another YL last night and we both laughed when I told her how it's hard to explain to friends when they ring that you are on a radio net, they just don't get it at all. Branch 27 members have formed a working bee to help members who are struggling with aerial problems. This has been so successful and now we have two more YL's back on the air.

WARO 50th Anniversary

What a fantastic achievement and how wonderful it was to see so many friendly faces both at Rotorua and Nelson. Looking back at the early photos of the first WARO Presidents you can only guess how difficult it must have been for them being introduced into what at that time was definitely a Man's Hobby. Congratulations to those girls and thank you for sticking with it.

It was wonderful to have Celia Reed ZL1ALK one of our original members present at Rotorua and of course Norma ZL1ANP who joined WARO in 1963.

Also great to have 5 ALARA members Jean Fisher, Catherine Hammond, Tina Clogg, Christine Taylor and Jenny Zietz, and their OM's join us for our celebrations. A couple of the girls have written an account of their thoughts of the 50th Award later in this article. Personally for me it was great to meet them face to face. It was wonderful for them to meet up with their sponsors from New Zealand.

Special thanks to Margaret ZL1MB Our President who did such a wonderful job of organising the Anniversary, even to making the delicious celebration cake. Special mention to Ted her OM ZL1MG whom I'm sure was a great support and help to Margaret , Joline ZL1UJB who made a wonderful job of the Anniversary Booklets, what an amazing feat and what a valuable record of our members. To Bev ZL10S who made the Certificates for everyone and Lynnette Zl1LL who ran the WARO 50th Award which was a great success. Of course there were many more who helped to make this event so great. Lovely to see NZART President Vaughan Henderson with his wife Jenny attend also.

50 years ago we held the inaugural 1962 gathering of NZ WARO at the historic Brent's Hotel, and the 50th this year was held at the Millennium Hotel which was built on the exact site.

President Margaret ZL1MB welcomed us, gave a bouquet to Celia ZL1ALK and Joline ZL1UJB, button holes for exec members present. Certificates were hand out for first decade members by Bev Osborne ZL1OS . Life members Celia ZL1ALK, Biny ZL2AZY and Cathy ZL2ADK were also give special buttonholes.

Some of our 50th Group ladies at the celebrations.

We also took time to remember our Silent Keys who we have to thank so much for their tireless support over the years.

Special Thanks also to the South Island girls who held their own 50th Award. They obviously had a wonderful day and it was great to see Jim ZL2BHF join then. Jim has always been a great supporter of WARO and deserved to be there.

Both venues had wonderful meals, a cake and good company.

Ngaire ZL2UJT, Sharon ZL2BQ, Topsy ZL2LS

WARO 50th Birthday

Saturday 10 March 10 WARO celebrated its 50th Anniversary of the formation of WARO which was formed, "To promote and encourage interest in Amateur Radio amongst Women". This has certainly been achieved.

The six WARO members from the Nelson Branch Topsy Zl2LS, Sharon ZL2BQ, Althea Zl2KAT, June ZL4MUF, Heather ZL2TYF, and Judy Zl2OBE, along with friend of WARO Jim ZL2BHF celebrated this event by going out for lunch. Celebrations were also taking place in Rotorua where the inaugural meeting was held on 10 March, 1962 at the then Brents Hotel.

We were all presented with a 50th

The group attending the lunch; Judy, Topsy, June, Sharon, Althea, Heather and Jim at Mapua Wharf.

ZL2BQ Sharon and ZL2LS; Topsy giving it a go. We had "Such Fun".

Nelson WARO girls cutting the birthday cake.

ZL2STR Stewart and ZL1BU; Graeme from Taupo having a great time.

anniversary book, with profiles of all the WARO members from around the country. This is an amazing book, to read about all the ladies, what they have done and achieved in their lives.We went to the Jellyfish Cafe which is on the Mapua Wharf. We had an amazing lunch, cut the cake, had some photos taken then had a look around the great shops, and galleries that they have over there.

A great day was had by us all and we look forward to many more years of WARO and women Amateurs on the radio.

33 and 73 *Topsy ZL2LS and Sharon ZL2BQ*

Here is what the wonderful Aussie girls thought of our 50th Celebrations

Our New Zealand trip from Christine VK5CTY and Tina VK5TMC

On 9 March five VK5s arrived in Auckland on the start of a couple of weeks in New Zealand. The main purpose of the visit was to help WARO celebrate 50 years since it was formed. Tina VK5TMC, Jenny VK5FJAY and Christine VK5CTY and two OMs, Robert VK5ZHW and Kevin VK5AKZ were joined by Jean VK3VIP and her OM, John VK3DQ and Catherine VK4GM and her OM, John VK4IO, on Saturday when we met the WARO YLs and their OMs at the Millennium Hotel in Rotorua.

This hotel is the actual place where WARO was formed exactly 50 years to the date of the celebration this year. The only YL present that day who was also present in 1962 was Celia ZL1ALK, but two others had been members of WARO for 40 years and two for 30 years, all of whom were presented with certificates and flowers. Biny ZL2AZY was also presented with a certificate acknowledging her success in the Thelma Souper Contest in this auspicious 50th year. The formalities were managed very efficiently by Margaret ZL1MB President of WARO. The smorgasbord put on by the hotel was magnificent and the whole setting was beautiful.

The Australian visitors were welcomed with open arms and there were many happy people meeting friends they had made over the years, particularly with the WARO girls and their OMs who had come across the sea to join us at our ALARAMEETS over the years. We were delighted to be able to return the compliment.

Jock White Field Day

by Sharon ZL2BQ

Paul ZL2PO had decided to run the Jock White field Day as he had never done one as a club event before and he is a very keen HF man. This was run at Monaco Reserve. Paul ZL2PO, Dave ZL2BCA and Jim ZL2BHF arrived around midday to set up and put the tent up which we would be operating out of. It was a good to so much interest in what we were doing by those who lived nearby and those who were just passing by or walking their dogs. They were very surprised to see so many younger people being involved in the hobby. Many of them had an older relative or friend that had been a ham or had known someone who was. Hopefully this will help by getting a few more into the hobby, especially with our open night coming up this month. This was a fun day for all those who attended. We had quite a few of our local hams come along and give it a go. We had someone operating the entire time which was from 3pm on the Saturday to midnight and then starting again at 6am Sunday until 3pm in the afternoon. We did it in pairs, we had one filling in the log sheet while the other was doing the calling. Topsy ZL2LS and I (Sharon ZL2BQ) had great fun with a few cheeky comments going back and forth from those who knew us. Jim ZL2BHF did all the Morse. We had 15 hams from our club come along to support us and operate, so thanks guys. Paul ZL2PO had said this was to be just a fun night with no expectations but who knows what the score will be. Once they have been tallied up they will let us know. Jim ZL2BHF has done a quick calculation as he knows how to do this stuff which is below. This still has to be sent in and confirmed.

Cheers all from,

Sharon ZL2BQ

Silent Key

- ***Alwyn ZL1CCJ***

Alwyn was a friend of WARO and long time supporter. His YL Jaqueline ZL1JAQ became a silent key some years ago. She was a WARO Secretary and also on executive for a number of years.

ALARA Editor retires

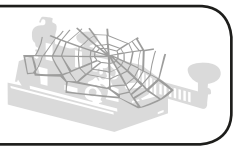
Dot VK2DB retires as Editor of ALARA magazine after 20 years, you will be sadly missed Dot as you wrote an amazing Newsletter.

If there are girls reading this who do not belong to WARO, please think about joining our wonderful group. After Conference we will print names of all Committee for you to contact, but for now here are our contact details. As we come from the two islands if you call us we can pass on your details.

- Topsy ZL2LS <waro@nzart.org.nz> phone 03 5450962 (South Island)
- Ngaire ZL2UJT <waro@nzart.org.nz> phone 06 7552444 (North Island)
- Sharon ZL2BQ <waro@nzart.org.nz>

Silent Keys

The Association deeply regrets to record the death of the following members and extends its sympathy to the bereaved.



Silent Keys: guidelines to contributors

Contributors are requested to limit their obituaries to between 200-400 words. Content should focus mainly on the amateur radio activities of the deceased. Normally photographs cannot be included.

Roy David Stewart ZL4JL

Roy Stewart ZL4JL, RNZAF 411655 died on 26 Aug 2011 aged 90 years. Roy joined the Eastern Southland Club Br08 in Feb 1939. He volunteered for the Air Force in 1941 and after completing the Radar course at the E&W School, Wigram, was assigned to a small group of technicians who installed and maintained radar stations in NZ and throughout the Pacific islands.

After the war he set up his own radio sales and servicing business in Gore and which is still going today as a branch of Selectrex®.

When TV first came to NZ Roy built a translator which rebroadcast signals from Dunedin to the surrounding Gore area until closed down by the authorities.

Roy was very involved with Rotary, being a Charter Member, President, Secretary, a life member and being selected as a Melvin Jones Fellow.

Our club extends our sincere sympathy to Lola and their family.

John Norton ZL4IM

Harry Shilling

Harry Edward Shilling was a radio engineer in the NZ Post Office for the greater part of his working life and whilst he never became a Radio Amateur was influential in generating an enthusiasm for radio among his fellow engineers and technicians who did qualify as radio amateurs and will be fondly remembered by them. Consequently a few words on Harry's life history seem appropriate in *Break-In*.

Harry was born in 1925 in Kent, England. In 1941 he joined the RAF Air Training Corp , became a member of the RAF Volunteer Reserve and was trained as a navigator qualifying in August 1945 but the war ended before he flew operationally. He gave up flying and retrained as an instrument serviceman then was demobilized in 1947,

He tried work as a civilian but was dissatisfied with that available in the UK at that time and applied for work in NZ. He was accepted and worked in the NZ Forest Service to start with. Eventually he went back to study on his own accord and ended up obtaining an MSc at Wellington University with a thesis on testing the performance of a valved amplifier at 1 GHz.

He then was accepted for work with Radio Section of the NZ Post Office in 1957 and was employed in many fields including the radio laboratory, VHF multichannel radio systems, submarine cables carrying multichannel telephony and land cables before returning to satellite systems and land mobile radio including cellular systems. Harry retired in 1987 as Supervising Engineer Radio for all New Zealand,

Outside of work Harry's interests were in gardening and house building. He leaves a wife Margaret and two adult children.

Reg Motion ZL2LX

DX Downunder

Graeme Hunt ZL1ANH and ZL1T
<graemeh@xtra.co.nz>

Band conditions haven't been great, particularly below 10 MHz, and the sunspot count dipped down to around 100, but as of late April it has climbed to 162. Strangely, just as I'm typing this, I've worked LZ2DF on the long path on 14 MHz at our mid-day, so who knows what's out there. Spratly 9M0L didn't seem as active as some other DXpeditions, but many ZLs worked them at least once. There haven't been a lot of very rare operations although it was great to hear Vanuatu YJ0VK again.

ZD7VC from St Helena had a good RTTY signal on 14 MHz long path around 0730z.

RI1ANF is on from South Shetland, his signal was weak with pronounced auroral flutter. He will be there for a few more months.

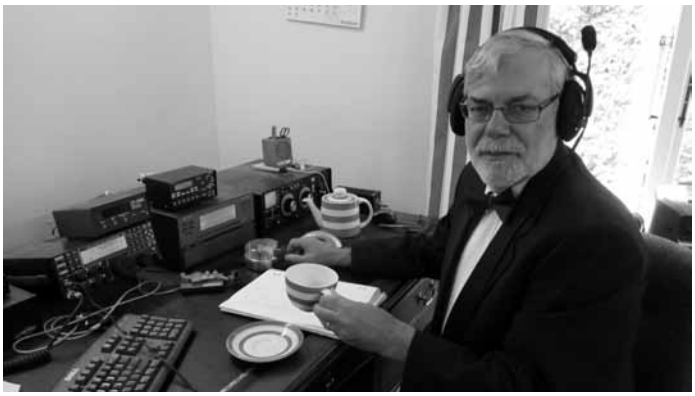
ZL9HR Campbell Island. In the February *Break-In* I mentioned that this entity was one of the most sought after. The good news is that a DXpedition is now planned from 17 to 30 November. Team leader is Tommy VK2IR with 9 other operators. Tommy is still looking for operators, approximate cost will be NZ$8000 each. See <wwwZL9HR.com> for further details.

Campbell Island is a UNESCO World Heritage site with many restrictions on visitors. It lies at 52°S, 700km south of New Zealand in one of the roughest oceans. Average November temperature is a balmy 7°C.

Expense is always a major hurdle for this type of operation. In April 2012 *QST* magazine, Bernie W3UR writes that the recent DXpedition to South Orkney VP8ORK cost almost US$350 000, so consider donating to the Campbell DXpedition.

VK9 Lord Howe Thinking of activating this rare one? Try <www: BlueLagoonlodge.com>. Owner is Des VK9FLHI who of course understands why you need to put up an antenna, stay up all night and be grumpy at breakfast.

BERU Operators BERU (British Empire Radio Union) is an annual CW contest run by the Radio Society of Great Britain (RSGB) amongst members of the British Commonwealth. It is the longest running amateur radio contest and this year was the 75th anniversary. As well as the usual format, countries, and some areas like those in the Caribbean, make up teams of five operators. Dave VO1AU, currently working in China, came down to the Chathams to operate as ZL7/VO1AU and after the contest visited several of us in ZL. Dave quite impressed at my shack, he ran a huge CW pile-up at 30wpm; while reading *Break-In* magazine.



Phil ZL3PAH, another Djarjeeling Jeeves?

Bill ZL3NB from the American colony.

Sherlock Garry ZL2iFB was assisted by Dr Watson.

This year several of the ZL entrants dressed as British as possible for the occasion. It must be stated that one of them became somewhat geographically challenged, and seemed to be dressed to watch baseball instead of cricket. Whether you want it or not, here they are.

The operating I heard was certainly much better than their dress sense, however band conditions were very poor. Results are not to hand at time of publication but it is hoped RSGB will not factor in an attire handicap.

Geoff ZL3GA hoping there are no drafts in the shack.

Mark ZL3AB.

DXpeditions

Angola D2QV Valery is active on CW, SSB and RTTY: 40m/20m/17m/15m/12m/10m till July 2012

Burundi 9U look for HA3JB, now living there. 20m SSB and PSK31

Campbell Is ZL9HR 17 to 30 November

Djibouti J28RO until July 2012

Gabon TR Sebastien, F4EIH, will be in Gabon for at least three years

Jan Mayen JX9JKA till March 2013

Lebanon OD5/IV3XN till October

St Paul Island CY9 will be active on all bands and modes between late July and early August

St Paul Island CY9M From 26 July to 1 August

Tanzania 5H9CP From 11 to 22 June.

Yemen 706T made a welcome and unexpected appearance in May to the delight of the DX fraternity worldwide. They operated from Socotra Island and pile-ups were immense. Yemen was the fifth most country in the world and hasn't been active since 1964.

ZL Special Calls

None advised for this issue.

Nets

ANZA Daily: DX net at 0515z on 14183 kHz and now also Saturdays 0445z on 21205 kHz. Mondays, Fridays and Saturdays it is followed by the Pacific DX net on the same frequency from 0600z.

Arabian Net: Fridays only 0500z 14250 kHz - host JY5HX and features exotic Middle East calls.

ZL DXers: Tuesdays 8pm NZ 7105 kHz summer, 3777 kHz rest of year

What's on the air now? <www.dxsummit.fi/DxSpots.aspx>

Announced operations: <www.ng3k.com/Misc/adxo.html>

QSL information: <www.qrz.com>

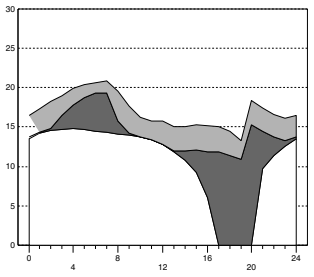
Sunspots: <www.solarcycle24.com>

Acknowledgements: ARRL DX-QST, 425 DX, OPDX, ARLDO17

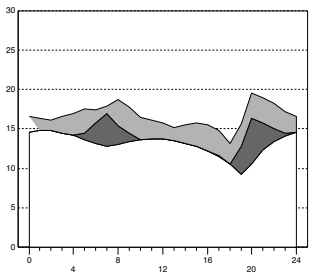
Contact me at *Call-Book* address or by email at <graemeh@xtra.co.nz>.

Ionospheric Predictions

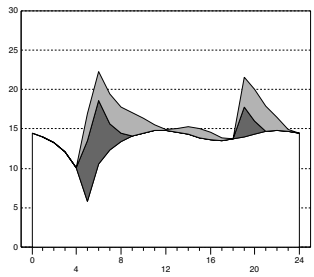
JULY / AUGUST 2012 **T-index = 82**



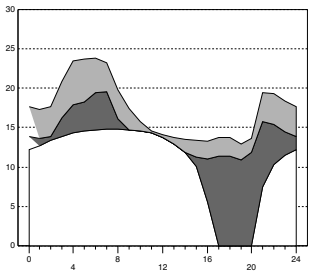
WN-
Moscow
(SP)
16548 km
312°



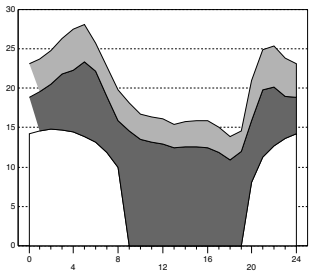
WN-
London
(SP)
18814 km
343°



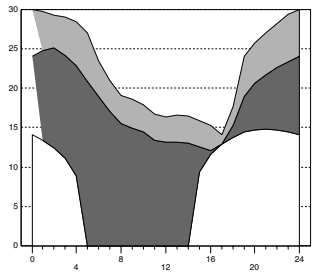
WN-
Jo'burg
(LP)
28265 km
31°



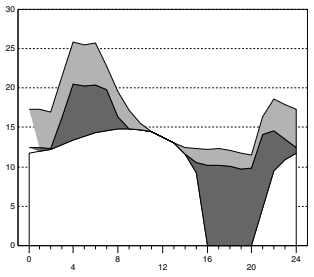
WN-
Istanbul
(SP)
17168 km
281°



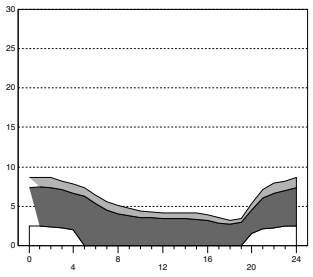
WN-
Tokyo
9274 km
332°



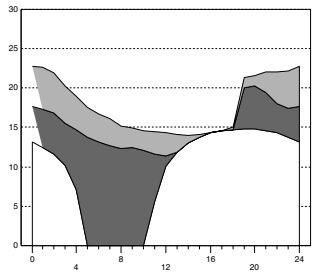
WN-
San
Francisco
10859 km
45°



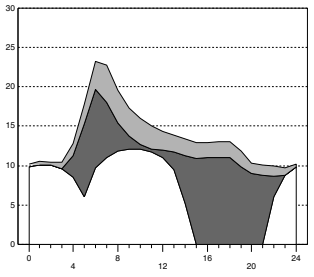
WN-
Cairo
16519 km
261°



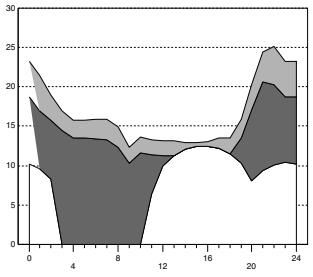
WN-
New
Zealand
300 km



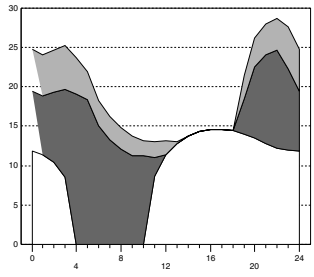
WN-
New
York
14402 km
66°



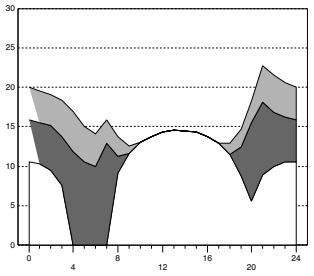
WN-
Jo'burg
(SP)
11759 km
211°



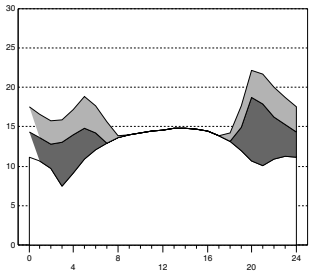
WN-
Rio de
Janeiro
11780 km
144°



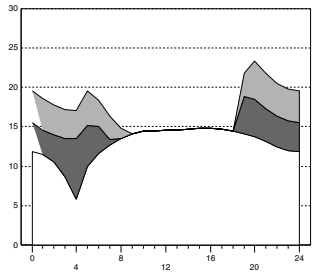
WN-
Barbados
13962 km
104°



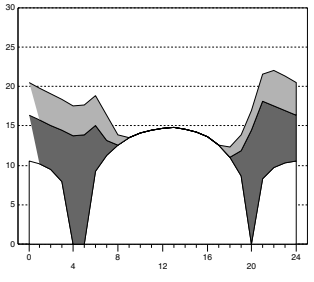
WN-
Dakar
16862 km
155°



WN-
Moscow
(LP)
23476 km
132°



WN-
Istanbul
(LP)
22856 km
101°



WN-
London
(LP)
21210 km
163°

Horizontal axis shows time in UTC.

Vertical axis shows frequency.

Propagation is possible in the shaded areas, with best operation in the darker area.

These predictions are based on solar activity data supplied by IPS Radio and Space Services.

See pages 6–9, Break-In May/June 2004 "Choosing the Best Frequency" by the late John Gabites ZL2AQ for interpretation of forecasts and explanation of terms MUF, OWF and ALF.

HAMADS

WANTED: RADIO VALVES. Cash paid for old radio and TV valves. Prefer new in boxes. Telephone (09) 528-2022 or E-mail <paul.ssegrub01@gmail.com>.

WANTED: Icom IC745 Transceiver. Could consider one in a none operating condition. S. Vincent ZL4OW. Telephone (03) 434-5428 or E-mail <stanvincent@xtra.co.nz> or *Call Book* Address.

WANTED: FT-790RII All Mode 70cm transceiver going or not with the clipon 25w linear amplifier (FL-7025) or just the amplifier. Kevin ZL3DAC. Telephone (03) 789-9875.

WANTED: Your old Kantronics Packet TNC (KAM or other models). Anything considered. Paul ZL4AX. Telephone (021) 158-2521 or E-mail <zl4ax@yahoo.co.nz>.

WANTED: Kenwood AT-50 with cable. Kenwood PS-33 (or 430) with manuals. GME 11 amp power supply. Must be in good condition. E-mail <tony.case@clear.net.nz>.

Answers to crossword on p27

Across: (1) Georg Ohm, (7) light emitting , (9) inn, (10) lucidly, (11) Cornish, (13) station, (15) scents, (17) BW, (18) geological, (20) EI, (21) Net, (22) DM, (23) assist, (24) assess

Down: (1) galvanising, (2) organisations, (3) getter, (4) Hamilton, (5) rugby, (6) diodes, (8) technicians, (11) CO, (12) hotbeds, (14) idiots, (16) swims, (19) lei

Hamilton Amateur Radio Club

MARKET DAY

Saturday
11 August, 2012

Waikato Table Tennis Stadium
Edgecumbe Street

Vendors from 8am
Buyers from 10am

Table space at $20 per metre (prepaid)
$25 per metre on the day.

All enquiries to:
Market Day
Hamilton Amateur Radio Club,
PO Box 606, Hamilton.
E-mail: harcmday@nzart.org.nz
Web www.zl1ux.tripod.com/market_day.html

WANTED: ICOM 701 receiver parts , dead or surplus reciever parts. Details and price to <ZL3DC@yahoo.com>.

WANTED: For a A510 Transceiver. (Australian built early 1950s). Microphone and Receiver Headgear Assembly. S1 Light weight complete with plug Telephone handset S1 No 4A Complete with 5 pin plug If plugs only available these will be accepted. Peter Le Quesne ZL4TCC, 23 Oriel Place, Napier 4112. Telephone (06) 843-8212 or E-mail <paleq@clear.net.nz>.

WANTED: Power lead for FT101ZD or FT7B. Please contact Rob ZL1RJS. Telephone (021) 100-0763 or E-mail <zl1rjs@nzart.org.nz>.

WANTED: One inch vidicon for restoration of EMI 201 TV camera: RCA 8507A, 8572A, EMI 9677, 9728, EEV P841, P843. ZL2TAR. E-mail <doug.ingham@orcon.net.nz>

WANTED TO SWAP: Your Icom IC-R75 in good condition for my Icom IC-R1500 in good condition less than a year old. Contact Des Davey, 16 View Road, Te Kuiti 3910 or Telephone (07) 876-7525.

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Hamads and Classified Advertising in *Break-In*

Hamads up to 30 words are now free as a service to members but the following conditions will apply:

(1) Hamads. A single, free Hamad in each issue of *Break-In* is only available to financial members and Branches of NZART buying or selling personal equipment. Members and Branches wishing to use this service must include their NZART Membership Number or other evidence of membership. If possible they should use the official HAMAD form (on the reverse of their address sheet). If this is not convenient the advert may be emailed or sent typed double-spaced, but proof of current membership must be provided.

Each free Hamad is limited to 30 words; any extra words will be charged at the current rate of 25c per word, telephone and fax numbers count as two words each, e-mail addresses and *Call-Book* address as three words each. All prices include GST. Free Hamads will also be accepted for sales of deceased estates where the member was a financial member of NZART during the past 12 months and from branches who are financial members of NZART (ie have a Membership No).

Advertisements are accepted in good faith from amateurs and may only be used be the sale of used radio and allied equipment. The Association, or its representatives, can take no responsibility for them nor take part in any discussion resulting from sales or purchases; remember "Caveat emptor". In case of dispute, the Editor's decision is final.

Trade or business adverts, even from members, will not be accepted here, since this is a subsidised service to members.

(2) Classified Advertisements are available to members, non-members and commercial firms offering products or services for sale, etc. All adverts not meeting the Hamad criteria will be considered to be Classified Advertisements.

Classified Advertisements will be charged at 40c per word. Bold type is available at 50c per word. For semi-display (ie rule above and below) add $5.00. All Classified Advertisements must be pre-paid, receipts will not be given. All prices include GST.

(3) Display style adverts will be still be charged for at the current rates.

(4) Closing date. Please send Hamads and Classified Advertisements to The Advertising Manager, PO Box 1733, Christchurch, to be received no later than the 10th of the month prior to publication. Please make cheques payable to NZART; no cash or credit cards. The Editor and NZART Inc reserve the right to discontinue or decline any advertisement.

For further information and commercial advertising rates, please contact:
Lorne Douglas ZL2AHB, Advertising Manager, c/- PO Box 1733, Christchurch. Telephone (03) 358-9100. E-mail: <hamads@nzart.org.nz>.

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